Opti-feed

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TSM Control Systems, The Demesne, Dundalk, Co.Louth, Ireland.
Internet: www.tsm-conrols.com • Email: info@tsm-controls.com
+ 353 42 9335560 + 353 42 9334422

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1 Introduction

Thank you for purchasing a Optifeed metering device. This manual is addressed to operators and **qualified technicians** taking care of the metering of dry additives to ensure correct use of the Optifeed dosing unit.
ⓘ IMPORTANT NOTE: THIS MANUAL MUST BE READ BEFORE INSTALLING THE DOSING UNIT. KEEP THIS MANUAL IN A PLACE ACCESSIBLE FOR ALL OPERATORS.

1.1 Symbols

ⓘ Important note

Attention; safety regulations for the operator

1.2 Terms

Operator:	A person charged to operate, adjust, maintain and clean the machine.
Qualified Technician:	A specialized, suitable trained person authorized to execute the installation, non-routine maintenance, or repairs requiring special knowledge of the machine and how it operates.
Multi component:	Two ore more dosing systems on one machine.

1.3 Transport

To protect the Optifeed unit against damage during transport, the unit is packed in a cardboard box filled with polyurethane foam. Delivery terms are Ex-Works Dundalk, Ireland. Buyer is responsible for the transport. Optifeed cannot be held liable for any damage during transport.

1.4 Receipt

Check the unit thoroughly upon receipt. Pass any remarks to the local agent or Optifeed within 8 days upon receipt of goods.

2 General information

2.1 Safety

The equipment is only designed and may only be used for the dosing of dry additives. Any use that is not in conformity with the instructions is considered improper and as such frees the manufacturer from any liability regarding damage to things and/or persons.

Before switching on the unit for the first time, ensure that the mains power voltage applied is between 80 and 260Vac.

Always switch off the Optifeed control cabinet and disconnect the mains power plug from electrical power before performing maintenance.

Ensure that all parts are securely fixed to the extruder or injection moulding machine.

Dangerous voltages are present inside the control cabinet for up to 2 minutes after it has been switched off.

2.2 Certification

The Optifeed dosing unit is designed and produced in conformity with the following European regulations:

- Standards for machinery (health, safety, environment)
- EMC (electromagnetic compatibility)
- VEM (safety electric material)
- 2006/42/EG

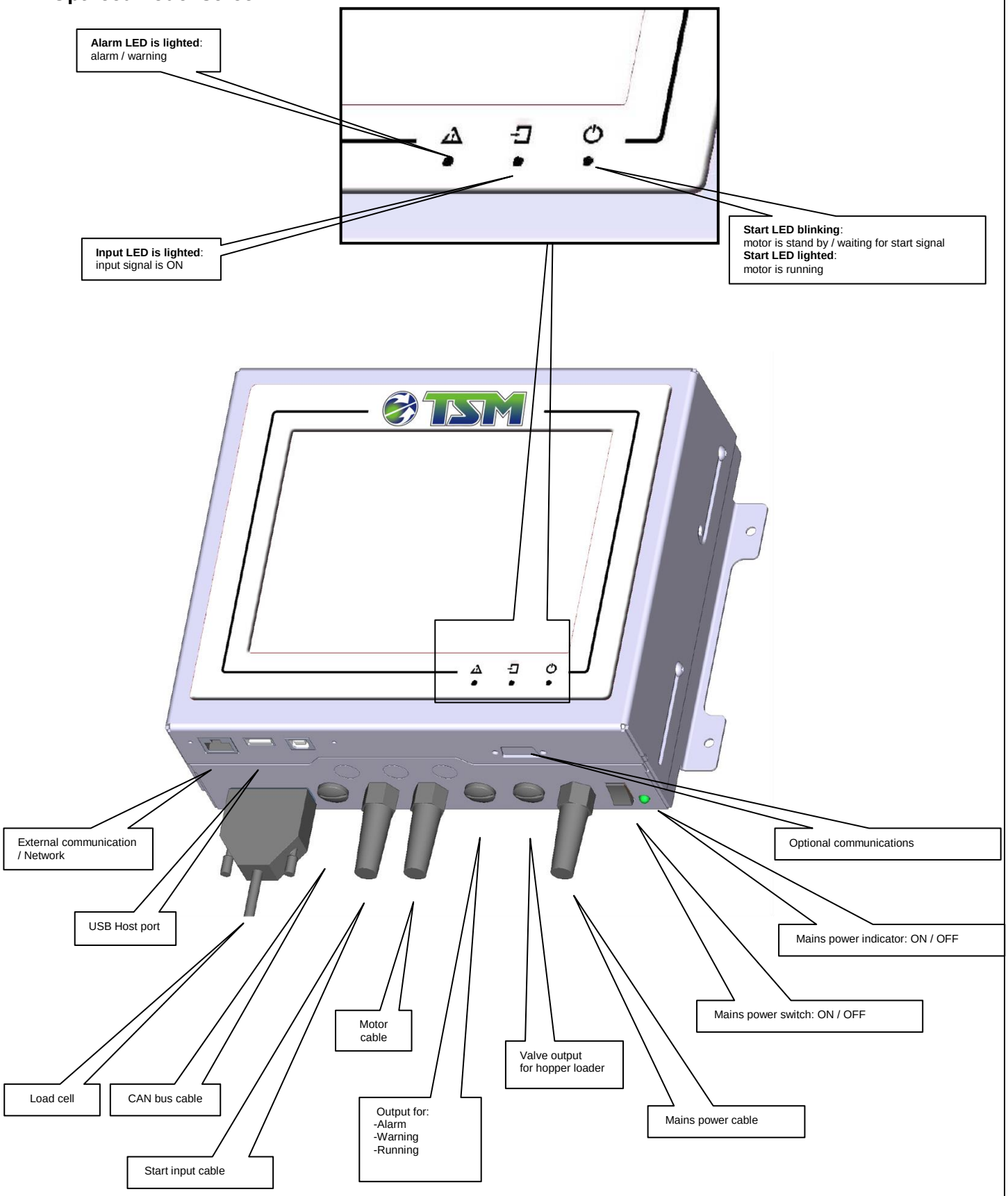
2.3 Operating environmental conditions

- The unit must be protected against weather conditions
- Operating temperature -20 to +70 degree. C.
- Protection class: IP-50

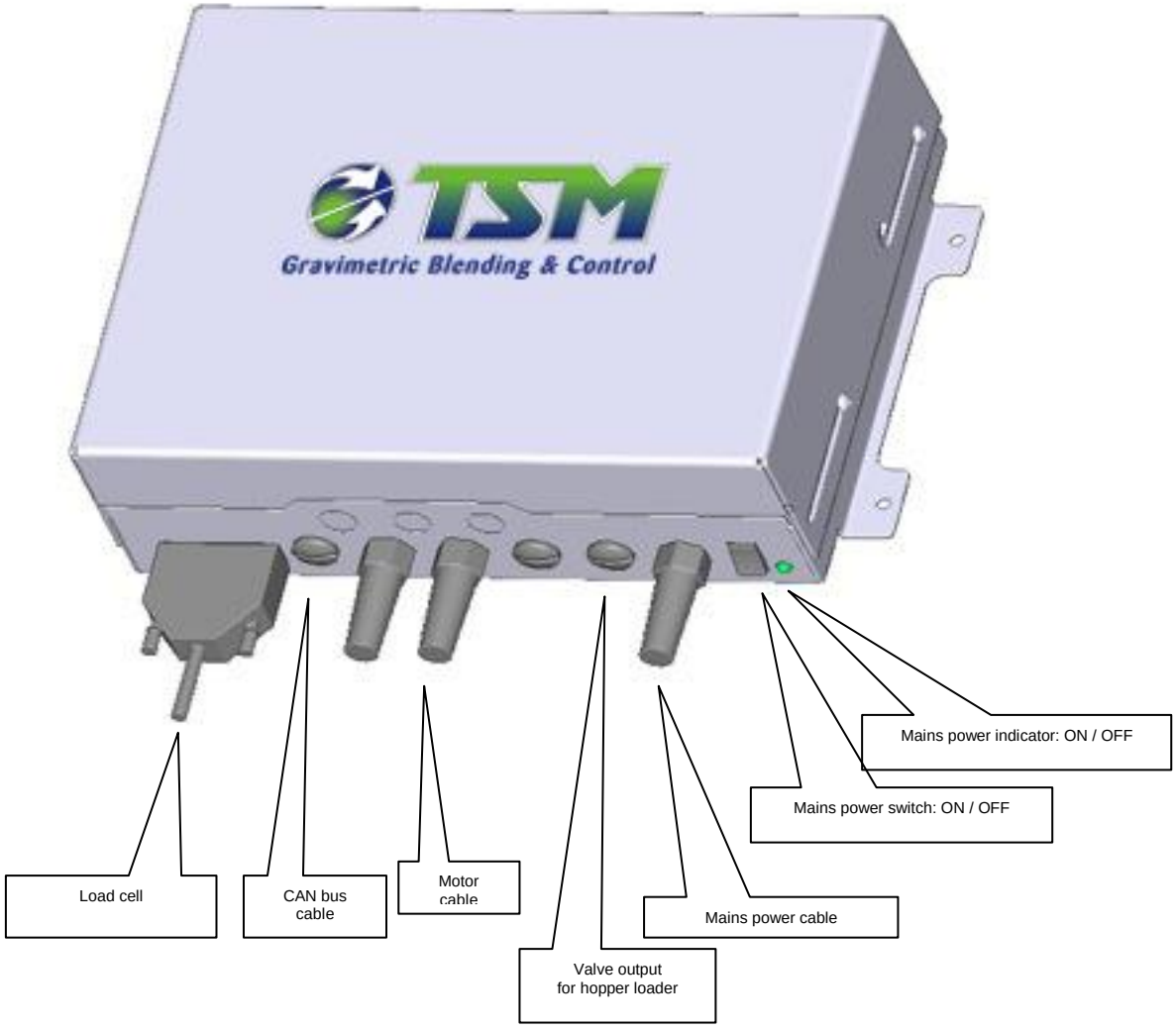
3 Operation

3.1 The Interface

Optifeed Touchscreen



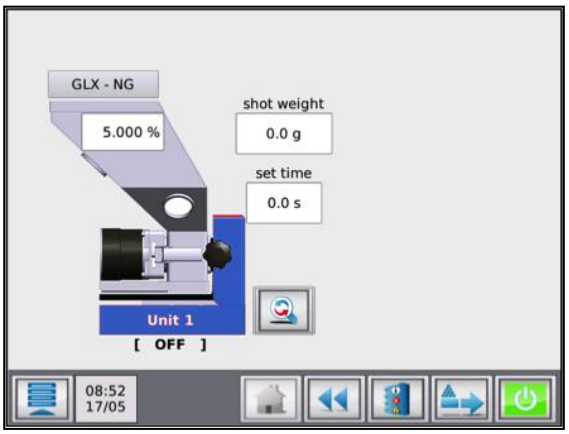
MC-BC Blind controller



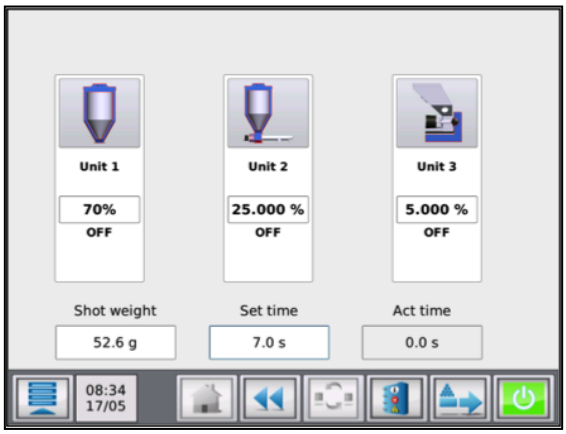
3.2 Start-up & Login

After switching on the mains power of the Optifeed, the screen will remain black for about 15 seconds, followed by various screens where the last is showing the software version.

After about 90 seconds the home screen appears.



Single component

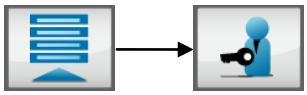


Multi component

The Optifeed controller has three user levels:
1. Operator **2.** Tooling **3.** Supervisor
The functions which are accessible per user level is shown in the table below.

The operator level is the standard level; only the important settings for production can be done. The rest of the settings / menus are invisible or locked.

For changing to another user level, press on the menu icon (left bottom corner) and the user button appears. When pressing the user button, the login menu is entered.



Press the LOGIN button and enter the password (4 numerals) and confirm. The passwords for the Tooling and Supervisor user levels can be defined by the supervisor in the “System Configuration” menu.

		USER LEVEL Can be changed in LOGIN menu.		
Function	**Description:**	**SUPERVISOR** Default code 2222	**TOOLING** Default code 1111	**OPERATOR** Default code 0000
[LOGIN]	To enter the different user levels.	**YES**	**YES**	**YES**
[CONFIGURATION]	To configure the dosing system.	**YES**	**YES**	NO
[PRODUCTION]	To do the production settings. *In OPERATOR level jobs and materials are read only.	**YES**	**YES**	**YES***
[HOPPER LOADER]	To do the hopper loader settings, only visible when a hopper loader is selected.	**YES**	**YES**	NO
[LEARN]	To learn material properties, only visible when control mode is set to GRAVI (Gravimetric).	**YES**	**YES**	NO
[LOAD CELL]	To calibrate the load cell.	**YES**	**YES**	NO
[WEIGHT CHECK]	To check the hopper or object weight.	**YES**	**YES**	NO
[ADVANCED SETTINGS]	To configure the dosing system and change language, number of components, etc.	**YES**	NO	NO
[ALARMS]	View of the alarm history	**YES**	NO	NO

ⓘ Recommended to note the passwords!

Forgot your supervisor password, enter the overall supervisor password **1689**.
When entering a wrong password the user level will be set automatically to operator level.

3.3 System Configuration

For initial setup the Optifeed controller needs to be configured. The following settings are for the entire system and there for needs to be altered once. It is not possible to change these settings for each separate configured component. For component specific configuration (Optifeed, High Output, Weight) see the device specific chapters.

The global settings can be changed in the “System Configuration” menu, to enter this menu:

Language : ENG / DE / FR / ……
Production mode : INJ / EXT
Input type : Timer / Relay / Tacho
Auto start : OFF / ON
Recipe function : OFF / ON
Start login : Operator / Tooling / Supervisor
Tooling passw. : xxxx 1111
Supervisor passw. : xxxx 2222
IP address* : 0.0.0.0 (For example: 192.168.1.100)
Netmask* : 0.0.0.0 (For example: 255.255.255.0)
Gateway* : 0.0.0.0 (For example: 192.168.1.1)
Date / Time : (dd / mm / yy) (hh / mm)
Number of contr.* : 1 XXXX
Kg/h units : ON / OFF
Imperial units : OFF / ON
Profibus** : OFF / ON
Device address : 1-231

* Restart of controller required
** Optional profibus module required

***System Configuration:* Language**
Standard language is English. If your language is not listed you can put a request at your local Optifeed representative for a translation.

***System Configuration:* Production mode**
Selection of type of machine on which the Optifeed dosing system is placed.
(EXT) extruder or (INJ) injection moulding

***System Configuration:* Input type**
Type of input signal. Relay, Timer or Tacho
Timer mode is the standard setting for Injection moulding.

	EXT		INJ	
timer			x	x
relay	x	x	x	
tacho	x	x		
	GRAVI	RPM	GRAVI	RPM

ⓘ In RPM prod. Mode. Timer is used automatically

ⓘ For INJ in timer mode the start pulse should be min. 0,2 seconds.
For INJ in relay mode the start signal should be as long as the dosing time.

If INJ - Relay is selected the dosing machine will follow the machine relay time.
The controller will filter small changes out so that the regulation is not being influenced.
Big changes will be followed.
The production screen shows the real machine relay time.

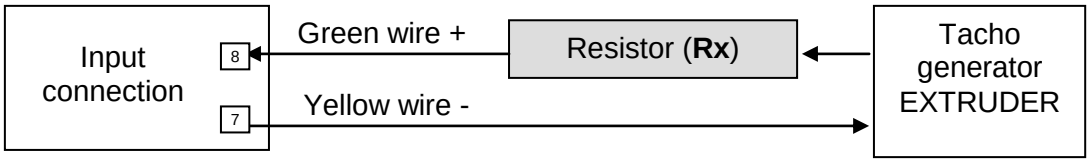
Input (start) signal
The Optifeed needs an input signal from the production machine in order to operate.
Three different input signals can be used to control the Optifeed.

1.) *A potential free relay contact.*
Use the white and brown wire for the potential free contact.

2.) *A relay signal 24 Volt DC*.*
In case of a powered relay signal connect the white wire to +24 VDC and the yellow wire to the 0 VDC.
* Note potential contact
Guaranteed OFF: 0-8VDC
Guaranteed ON: 18-30VDC

3.) *A tacho signal up to 30 Volt DC.*
This is used when the dosing system needs to be connected to an extruder that has a tacho generator that produces a voltage linear to the extruder speed. When using a tacho generator signal, make a connection between the white and brown wire. It will function as a start signal. Connect green to + VDC and yellow to the - side of the generator.

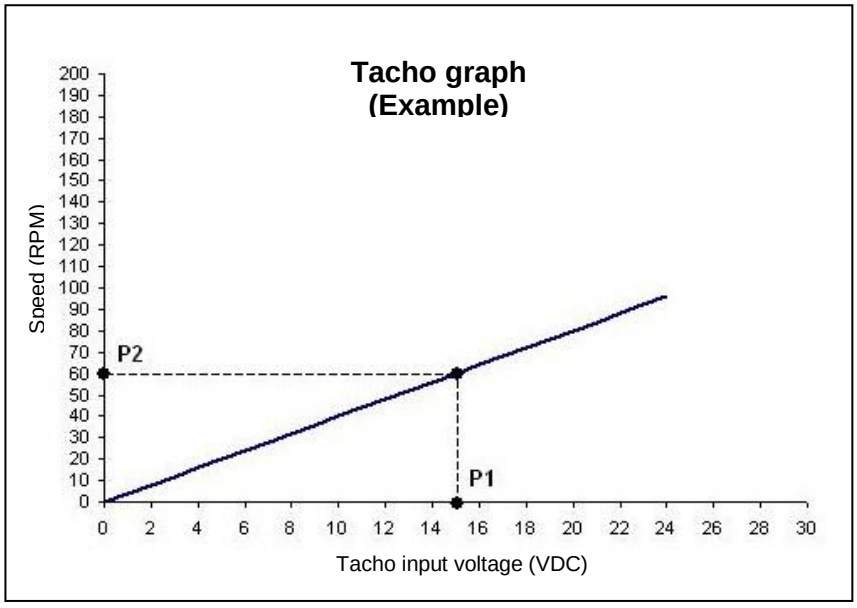
The maximum voltage that can be applied to the Optifeed is 30 VDC. The tacho voltage has to be reduced to 30 VDC if the tacho generator has a higher voltage output than 30 VDC at the maximum extruder output capacity. See the diagram below.



Rx (**kilo-Ohm**) = (2,684 x (Max. tacho output VDC – 5)) – 66

If the extruder stops when connected to the metering unit, an isolated signal converter is needed. Contact your agent or Optifeed for more information.

Tacho function
The tacho function is only available in extrusion mode.
This function can be used with extrusion when it is necessary that the dosing rate is automatically adjusted to the extruder speed. In tacho mode an input voltage is linked to a dosing speed setting. If the extruder speed changes, the tacho input voltage and speed of the dosing unit will change accordingly.
A linear correlation between extruder speed (tacho input signal) and the needed dosing speed is assumed. See graph.



The tacho function can be set in the PRODUCTION screen.
Tacho can be set manually or be synchronized:

Manual:
Fill in the voltage the tacho produced by the tacho generator at maximum extruder speed.

Synchronize:
Let the extruder run and select synchronize.
The tacho voltage P1 will be taken over automatically, enter the actual extruder capacity. This is linked to the set motor speed P2 (in RPM mode) or calculated motor speed (in GRAVI mode)

During production, the motor speed P2 can be changed. The new speed is linked to the previous stored voltage and the graph will change accordingly.

During production, the voltage P1 can be adjusted to the current tacho input voltage (manually or automatically) as shown above. The new voltage is linked to the previous stored speed and the graph will change accordingly.

-The maximum voltage that can be applied to the Optifeed tacho input is 30 VDC.
-The tacho signal must be a clear signal. Any failure in the voltage signal will be followed by dosing variations.

***System Configuration:* Auto start**
Enable / disable auto start-up after Voltage dip or mains power has been switched OFF.
When enabled the unit will continue dosing automatically after a Voltage dip or mains power has been switched OFF and ON again.

***System Configuration:* Recipe function**
Enable / disable recipe functionality

***System Configuration:* Start login**
User level to start up with, when switching on the controller's mains power.
Operator, Tooling or Supervisor.

***System Configuration:* Tooling passw.**
Password for Tooling user level, 4 numerals, default 1111

***System Configuration:* Supervisor passw.**
Password for Supervisor user level, 4 numerals default 2222

***System Configuration:* IP address**
IP-address for use in a network environment (TCP/IP protocol). (For example 192.168.1.100)
When the Optifeed dosing system is part of a network, the controller must have an IP-address for identification.
ⓘ This IP-address has to correspond with the IP-address of your computer. Ask your network administrator for a unique address.

***System Configuration:* Netmask**
Netmask for use in a network environment (TCP/IP protocol). (For example 255.255.255.0)
When the Optifeed dosing system is part of a network, the controller must have a Netmask for accessing the TCP/IP network.

***System Configuration:* Gateway**
Gateway address for use in a network environment (TCP/IP protocol). (For example 192.168.1.1)
When the Optifeed dosing system is part of a network, the controller must have a Gateway for accessing the TCP/IP network.
ⓘ This Gateway-address has to correspond with the Gateway-address of your computer. Ask your network administrator for the correct gateway setting.

***System Configuration:* Date / Time**
Actual date (dd / mm / yy), Actual time (hh / mm)
ⓘDate and Time will be stored for minimal 1500 hrs. with controller switched OFF.

***System Configuration:* Number of controllers**
Select the number of dosing units (1..5)

***System Configuration:* kg/h units**
Kilogram per hour units, enable / disable. Setpoints and actuals displayed in kg/h or g/s (gram per second)

***System Configuration:* Imperial units**
Imperial units, enable / disable. Setpoints and actuals displayed in lb/h or kg/h

***System Configuration:* Profibus**
Enable the Profibus communication, ON/OFF (requires a special hardware extension board)

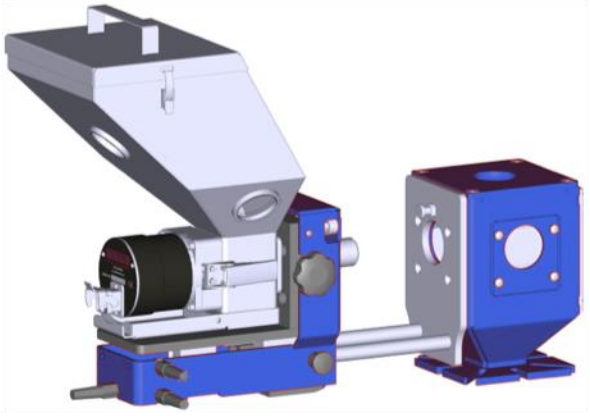
***System Configuration:* Device address**
If the controller is used in a Modbus or Profibus network, the unique identity can be filled in here (1-231)

3.4 Material curves

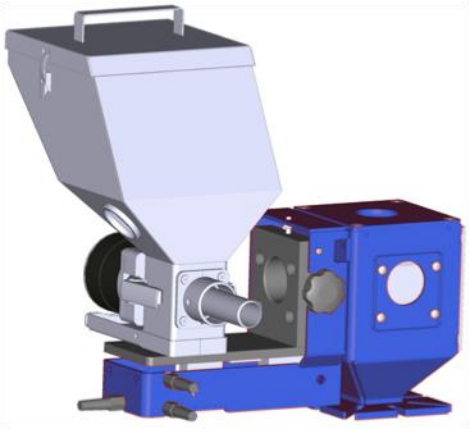
3.4.1 Offline Material curve learn function

Each material has its own flowing characteristic. This results in a material curve which is used for accurate volumetric dosing. During system start, when there is not enough measurement info available, the dosing system uses this curve. The speed of the dosing tool is then adjusted according to the learned curve. Using a pre-calibration results in a faster system start, the system will operate faster within the set specification.
The material curve learn function can be performed offline, to avoid waste of material.

The pre-calibration can be done in two ways (see below)



1) Unit with option slide frame:
Slide the frame with unit backwards till the “click”



2) Unit without optional slide mechanism:
Take out the dosing unit and put it on the frame like shown

ⓘ In case of a MC-High output, the dosing tube drain can be opened to avoid material waste.

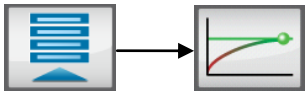
Before starting the material curve learn function, be sure that:

- during calibration the dosing unit is horizontally fixed and also vibration free.
- the correct dosing tool is mounted.
- the hopper is filled with sufficient material.
- the loadcell cable is connected to the controller.
- the loadcell is calibrated.

The following parameters will be stored with a Material calibration, depending on the configuration:

- CONFIGURATION parameters: Cylinder type : type of dosing cylinder or feed screw
  Material Type : Normal or micro-granules
- PRODUCTION parameters: Shotwth. : Shot weight
  color% : Color amount (%)
  dos.time : Dosing time (sec)
  Ext. cap. : Extruder capacity (kg/h)
- CALIBRATION parameters: Material name : Name of calibrated material

How to start the material curve learn function:

1. Press 

ⓘ In multicomponent setups it can be necessary to use the button to select the unit to be used.

2. Press the material “name” button and enter a material description.
3. Enter the production settings, recommended is to use the same settings as will be used in the final production.

   For injection moulding:
   - the shot weight
   - the dosing time
   - dosing percentage

   For extrusion:
   - extruder capacity (production rate)
   - dosing percentage

ⓘ The ideal situation is to choose the same settings as used during actual production, however when the output is to high and learn function cannot be completed within one hopper fill, choose a lower capacity.

4. Press the start button
5. A question will appear that you need to check if the motor is connected, the hopper is filled and if you want to prime the dosing tool, confirm the question.
6. The learning will take minimal about 3 minutes but can take more time depending on the used material and production parameters.
   It is possible to stop during the learning (for example to refill the hopper). When “Stop&Save” is selected the learning will pause. There are 3 options:

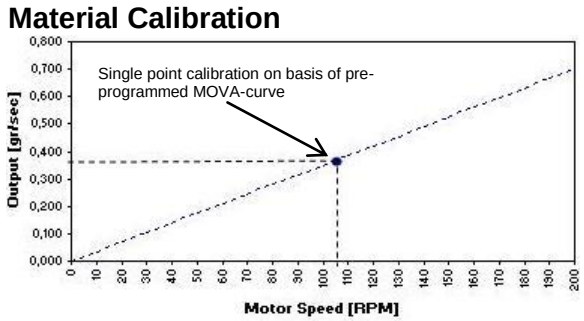
= Stop learning and save the collected data.

= Stop learning without saving.

= Continue with learning.

7. The unit will execute the calibration procedure, the procedure will stop when the dosing is within the calibration deviation range (default 5%), the material curve will be stored. This material is now automatically selected for the current unit.

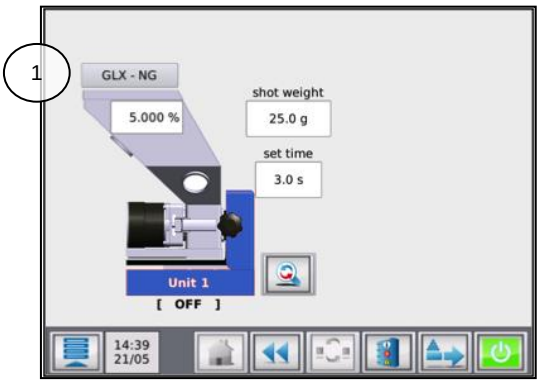
During the calibration the unit is regulating to his Setpoint. When this point is reached the calibration will be saved automatically. On the basis of this point a complete curve is made on bases of default pre-programmed curves.



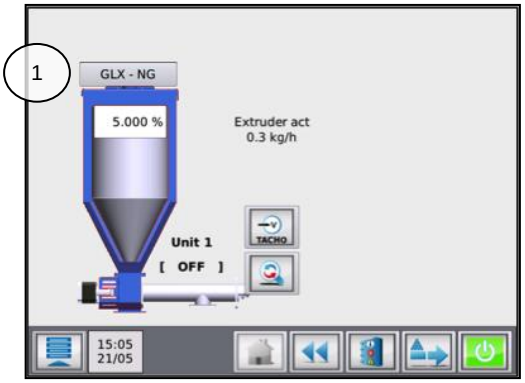
3.4.2 Selecting a learned material curve

When more material curve calibrations have been made, a curve can be loaded to the device. To do this:

1. In a multi component setup, select from the home screen the unit to load the material
2. Press the material selection button



1 Optifeed material selection button



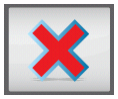
1. High Output material selection button

3. Select with the up and down buttons the required material name and confirm, you will be prompted when the wrong dosing tool is configured.

When the list of materials is big, it can be time consuming to find the material. It is possible to search in the list of materials using the search button. You can enter part of the material name you need to search for.
Example, you need to load the material named “pp-color-145”, when you enter “pp” in the search field, al material names containing “pp” will be displayed in the list.

Deleting materials/curves can be done by selecting it from the material list followed by the delete selected button.

Renaming materials can be done by selecting it from the material list followed by the rename selected button.

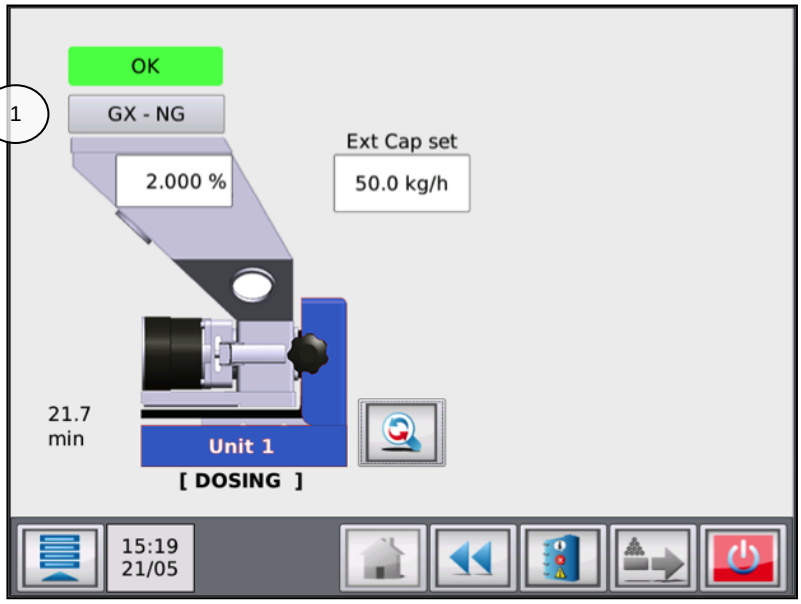


To go back to the production menu without selecting a material from the list press the cancel button.

The standard Mova curve can be selected by pressing the **“default material”** button located below the material list.

3.4.3 Save data function

This function allows to store the actual data during production. A material description needs to be entered to save this data. A full material curve on basis of the stored point will be saved in the memory of the controller under the entered name.
Starting a new production run with a previous stored material calibration/speed is now possible,



Press on the curve description (1) when the unit is activated. The “SAVE MATERIAL” screen appears.
Enter a material description (max.10 positions) and press to store the material curve.

3.5 Recipe function

With the Optifeed it is possible to store the current production settings into a recipe. All production settings of all units will be stored within this recipe. An easy recall of these production settings is possible by loading the previous stored recipe.

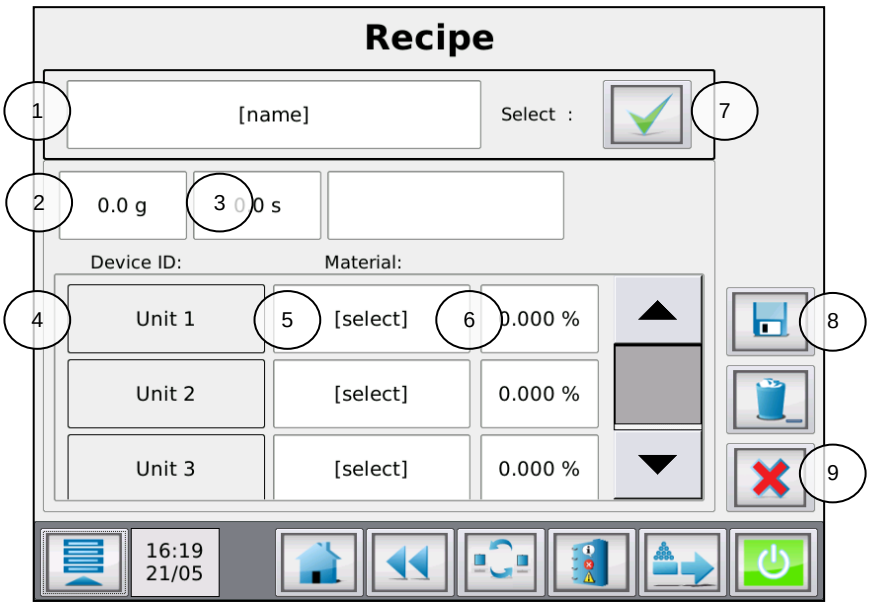
ⓘ The Recipe function must be enabled in the System Configuration screen.

3.5.1 Creating a new recipe

From the home screen, press the recipe button.

The Recipe screen will appear, select the “New Recipe” button:

The following screen will appear:



1. **Recipe name:** Enter desired recipe name.
2. **Injectionmolding:** Shot weight
   Extrusion: Extruder throughput kg/h
3. **Injectionmolding** (Timer only): Shot time
4. **Component name**
5. **Prelearned material curve:** Select the pre-learned material curve per component
   ⓘ In case of no prelearned materials it is recommended to select the Optifeed default curve
6. **Dosing percentage:** Enter dosing percentage per component
7. **Select button:** Loads the current recipe as active production setting
8. **Save recipe:** Saves current recipe settings
9. **Cancel:** leave this screen

3.5.2 Load / edit a recipe

From the HOME screen, press the recipe button:

Select the desired recipe by using the up and down buttons:

When the list of recipes is big, it can be time consuming to find the recipe. It is possible to search in the list of recipes using the search button. You can enter part of the recipe name you need to search for.
Example, you need to load the recipe named “Recipe RED 1”, when you enter “RED” in the search field, all recipes names containing “RED” will be displayed in the list.

Confirm the selection with the accept button:

The next screen will show the settings of the selected recipe. Here you can check the settings of the recipe.
By pressing the accept button the recipe will be loaded.

-OR-

Edit the production parameters within the recipe to your needs and save the recipe.

To save the recipe, just press the save recipe button , you will be promted to overwrite the recipe:

: Overwrite current selected recipe (changes in the recipe will be saved)

: Do not overwrite, you will be promted to enter a new recipe name (create a copy/new recipe)

ⓘ The new recipe is not immediately selected, go back to the main recipe screen to select the new recipe

A recipe can also be edited from the HOME screen. When a recipe is loaded and a production setting is changed, the recipe button icon will change:

By pressing this button, you will be prompted to overwrite the recipe, or to store the current settings under a new recipe name.

3.5.3 Delete a recipe

From the HOME screen, press the recipe button:

Select the desired recipe by using the up and down buttons:

To delete the selected recipe.

To delete all recipes in the list at once.

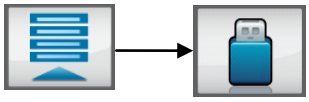
3.6 USB menu

The Optifeed is equipped with a USB host port. This port can be used for production and configuration settings backup/restore and Optifeed software updates.

ⓘ For software updates, contact your local Optifeed representative.
ⓘ Your USB memory stick should be formatted FAT32.

3.6.1 Backup / Restore

Insert your USB memory device into the USB host port (See chapter 3.1)
Press:



The USB menu will be shown, containing 3 options

1.	Copy files from USB to Controller	Restore files from USB stick to Controller
2.	Copy files from Controller to USB	Backup files from Controller to USB stick
3.	Remove USB stick	Safely remove USB stick

When choosing option 1(restore) or option 2(backup), a new screen will be shown with the next options:

1.	Materials and Recipes	Transfer of material, recipe and configuration files
2.	Configuration and Settings	Transfer of production log, event log and configuration files
3.	All	Transfer of all files (materials, recipes, configuration, log)

After copy of the files to the USB stick, you can store the backup files to a network drive or backup folder. The USB stick contains a folder named MC_TC, this folder contains the backup files.

The restore function can also be used to copy configuration, system and recipes to other Optifeed devices with the same hardware configuration, it is not recommended to copy material files between Optifeed controllers.

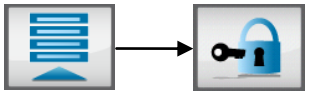
3.6.2 Remove USB stick

When you are ready with the required USB operations, it is mandatory to press the Remove USB stick button prior to unplugging the USB memory stick. You will be prompted when the synchronisation is finished and it is safe to remove the USB memory stick. This synchronizes the files of your USB stick for safe removal.

Risk of damaging your USB stick when not safely removed.

3.7 Screenlock

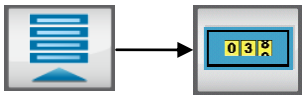
To avoid any unwanted modification in the production settings by an unauthorized person, the touchscreen can be locked. With this function enabled, you are still able to see actual production data, but you cannot change production settings. To enable and disable the lock function, you need to be logged on with at least TOOLING level.



To unlock, follow the same sequence.

3.8 Consumption counters

The MCTC is equipped consumption counters, counting the consumed material of each unit. To reset the consumption counters you need at least TOOLING level login.



ⓘ In multicomponent setups it can be necessary to use the button to select the unit to be shown.
ⓘ The consumption counters can have an error due to inaccurate measurement during hopper filling

3.8.1 Batch consumption counter

This counter can be used for batch counting of material consumption. It counts the amount of consumed material for the selected unit. The batch counter can be reset separately for each configured unit. To reset the counter, just press the RESET button next to the counter.
The batch consumption counter can be used for example:

- Order consumption registration.
- Daily consumption registration.
- Week consumption registration.

3.8.2 Total consumption counter

This second counter can be used for total material consumption. It counts the amount of consumed material for the selected unit. By resetting the Total consumption counter, the batch counter is also reset. To reset the Total counter, just press the RESET button next to the counter.
The Total consumption counter can be used for example:

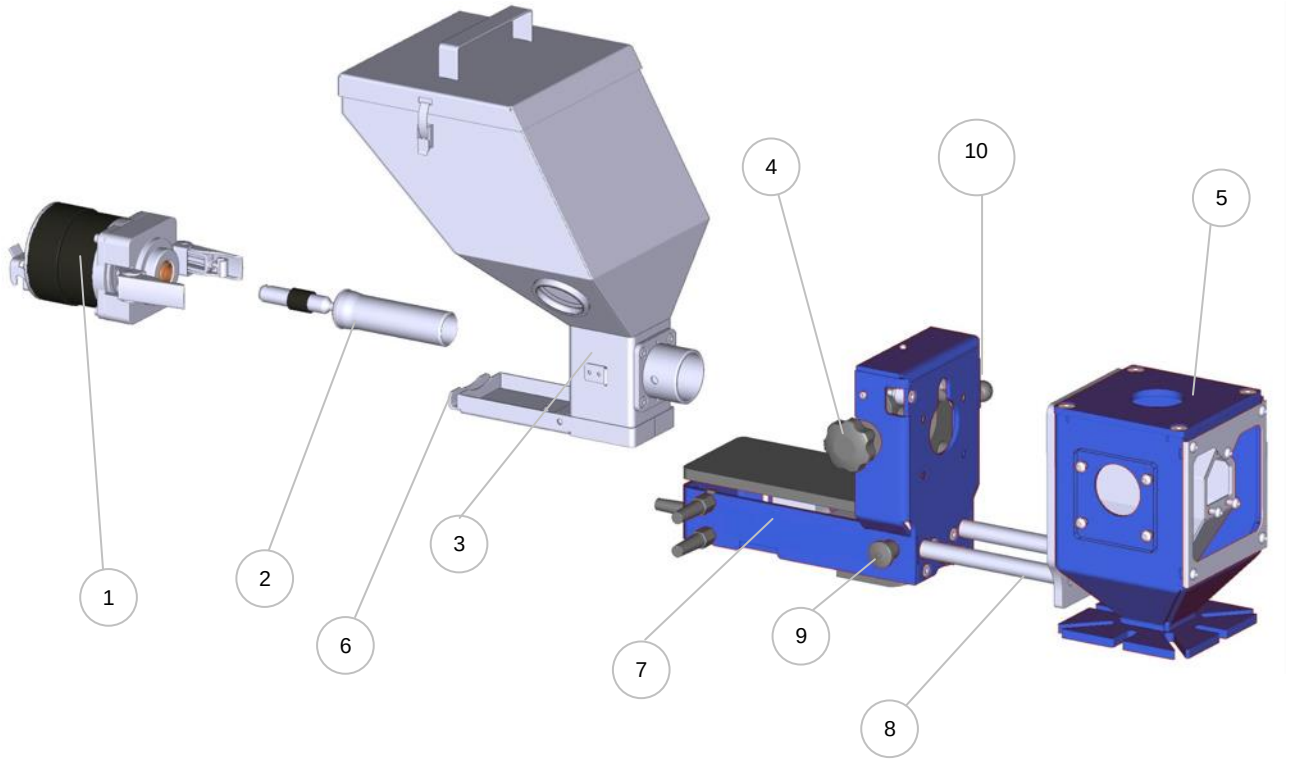
- Daily consumption counter, when the batch counter is used for shifts/batches.
- Week consumption counter.
- Total counter, counting all consumed material by the unit.

ⓘ For MC Weight + MC-TC(s), the consumption counters display only the material fed through the MC Weight, not the complete total consumed by the extruder. For a grand total you need to summarize the totals of all units.

4 Overview Dosing and Measuring units

4.1 Optifeed

4.1.1 Optifeed Component overview



1 Stepper motor

2 Dosing system (Dosing cylinder)

3 Hopper (6 litre)

4 Curled knob M10x40

5 Standard NST40 Neckpiece

6 Material discharge slide (in closed position)

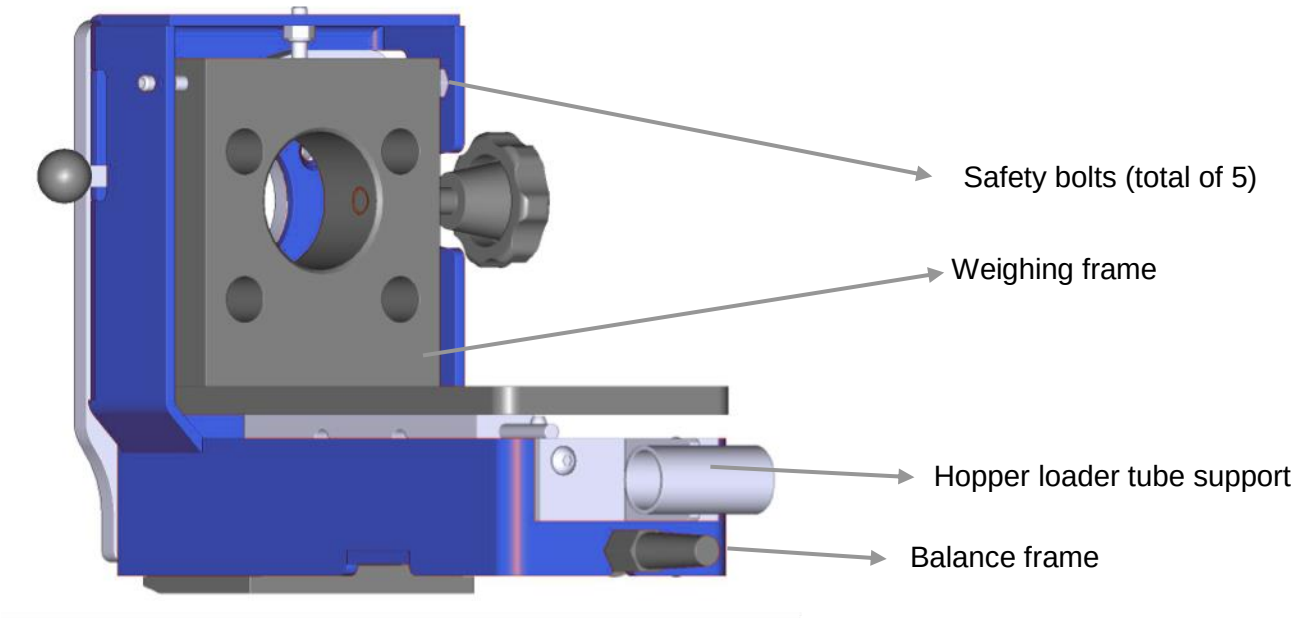
7 Optifeed Load frame

8 OPTIONAL Slide frame

9 Slide locking bolt
(locking the slide-out position)
Only supplied together with the optional slide mechanism

10 Slide locking bar
(locking the slide-in position)
Only supplied together with the optional slide mechanism

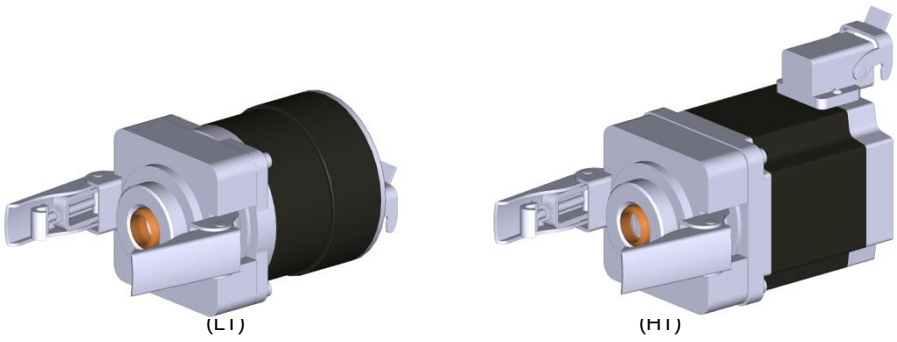
Weighing frame



The black part is the weighing frame.
Do not touch this weighing frame (and dosing unit) while dosing.
It will have influence on the dosing.
Do not touch the safety bolts under the weighing platform. These are for overload protection.
There must be some space between de safety bolts and the frame.

4.1.2 Optifeed motor and dosing system

The Optifeed dosing units are standard equipped with the stepper motor 2A (LT), in case of using the feed screw A30 the stepper motor 4,5A (HT) will be supplied. Also a screw A20 can be connected to the HT motor.

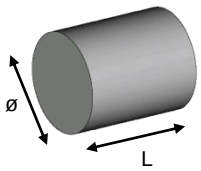


ⓘ During configuration of the software, do not select the HT motor if LT motor is connected. This will damage the motor. If LT motor is selected and HT motor is connected there will be less motor torque and this can influence the dosing.

The controller of the dosing unit makes a distinction between two groups of materials, normal granules and micro granules. To determine the kind of material in your application use the description below.

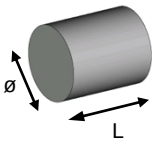
Material types

Normal Granules: (NG)



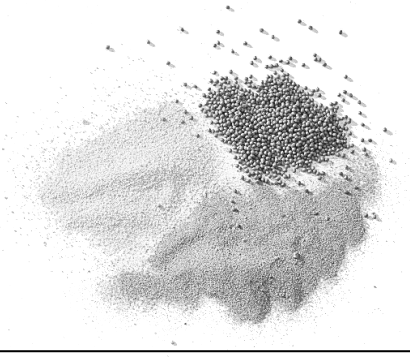
ø 2,5 < 4 mm L < 4 mm *

Micro / Mini Granules: (MG)



The term Micro/Mini Granules also includes free flowing powder.

ø < ø2,5 mm L < 3 mm *



* For other sizes contact Optifeed.

The actual capacity of the dosing system depends on:

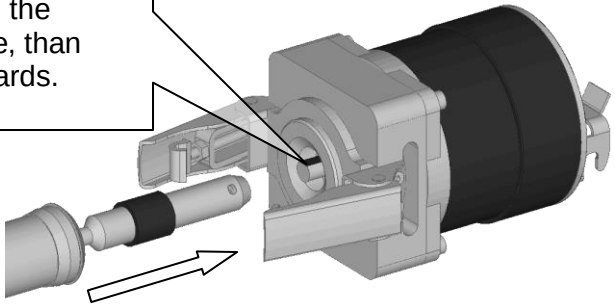
- The volume weight of the material *(bulk density)*
- The specific weight of the material *(specific density)*
- The granular shape of the material
- The granule size
- The surface structure of the material

Granular material can be normal or micro. The granular material and powder material has to be free flowing, non-static and not sticky.
There are mainly two dosing systems, the dosing cylinder and the feed screw.
(for more information see chapter 4.1.4)

The serial number of the motor can be found on the backside of the motor.

Motor axle:
The motor shaft is equipped with one flat side which fits exact in shaft of the dosing cylinder.

To connect the dosing cylinder just put it on the motor axle while turning it to find the flat side, than press the dosing cylinder completely backwards.



4.1.3 Optifeed metering principle

The Dosing Cylinder® of Optifeed combined with a very precise adjustable stepper motor ensures that the additive output is accurate and regular. The neckpiece (a mixing chamber) is designed to blend the main material and the additive homogeneously. Optifeed has on stock a large range of machine neckpieces that usually make a perfect fit to the injection moulding machine or extruder. The most common mounting of the neckpiece is between the production machine and the hopper. In the figure below a cut through of the NST40 neckpiece can be seen.

Standard neckpiece
During operation, the virgin material runs from the machine hopper through the neckpiece into the machine. Inside the neckpiece the Virgin material flow is divided into two streams
by the cover plate. In the space below the cover plate, the rotating cylinder is dosing additive.

Additive is added directly into the center of the virgin material flow, just before it enters the production machine. This is a great advantage over metering devices that use batch pre-mixing because pre-mixing can actually cause material separation. Separation of materials results in an irregular additive flow into the production machine.

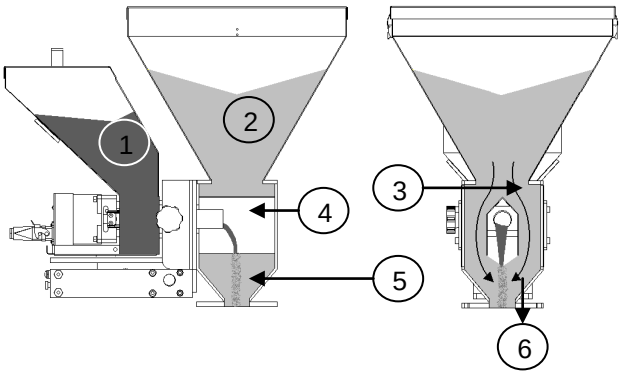


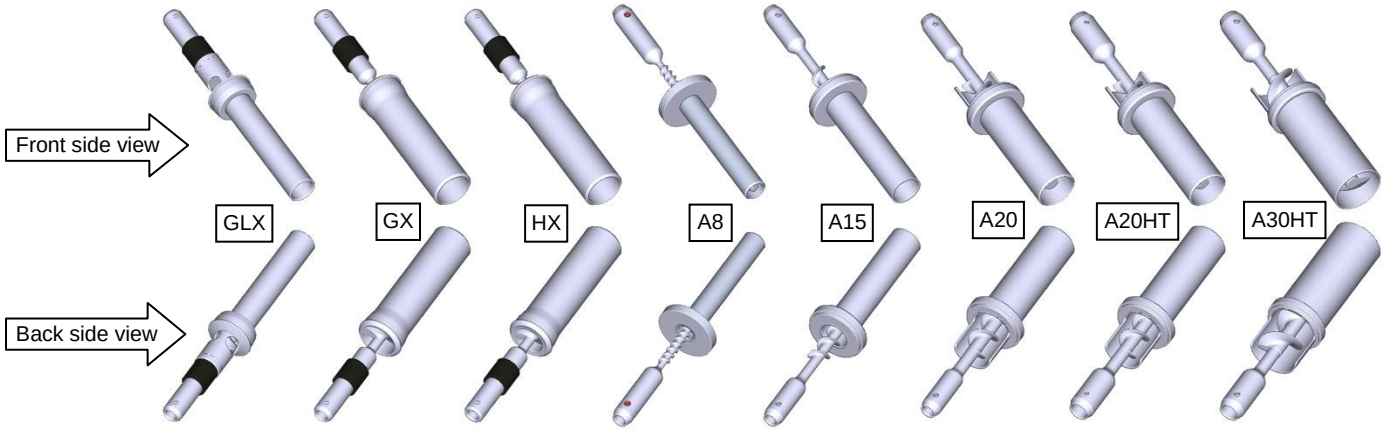
Fig. 3
1. Color 2. Virgin material 3. Neckpiece 4. Dosing cylinder
4. Cover plate 5. Mixing zone 6. To production machine

4.1.4 Optifeed dosing system / capacities

Depending on the application a different dosing system might be needed.
Use the following table to determine roughly the best system for the application. For more detailed information please contact your agent or Optifeed.

Dosing system	Granular materials	Powder Materials	Accuracy	Dosing capacity Gram/sec.	Dosing capacity Kg/hour
GLX	**YES**	**YES**	**++**	**0,02 to 1,6***	**0,07 to 5,8***
GX	**YES**	**YES**	**+**	**0,2 to 5,0***	**0,72 to 18,0***
HX	**NO**	**YES**	**++**	**0,01 to 1,6****	**0,04 to 5,8****
A-8 Feed screw	**YES**	**YES**	**+**	**0,02 to 1,0***	**0,07 to 3,6***
A-15 Feed screw	**YES**	**YES**	**+/-**	**0,2 to 5,0***	**0,72 to 18,0***
A-20 Feed screw	**YES**	**YES**	**+/-**	**0,5 to 20***	**1,8 to 72***
A-30 Feed screw * **	**YES**	**YES**	**+/-**	**2 to 50***	**7,2 to 180***

Note * measured with normal granular master batch 0,8 kg/dm3.
Note ** measured with free flowing powder 0,65 kg/dm3.
Note *** only available with high torque (4,5 Amp) stepper motor



Which type of dosing system do I need with which neckpiece?

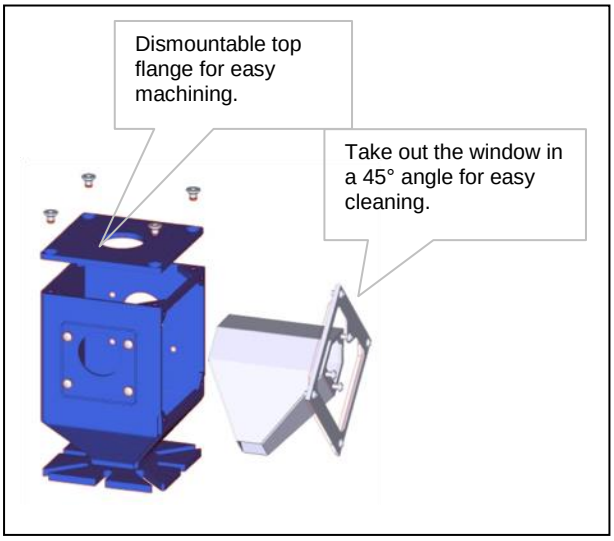
TYPE	CODE FOR STANDARD NECKPIECE	CODE FOR WATERCOOLED NECKPIECE OR SUPPORT FRAME	CODE FOR WATERCOOLED NECKPIECE AND SUPPORT FRAME
GLX	GLX	GLXC	GLXCSF
GX	GX	GXC	GXCSF
HX	HX	HXC	HXCSF
A8	A8	A8C	A8CSF
A15	A15	A15C	A15CSF
A20LT	A20	A20C	A20CSF
A20HT	A20HT	A20HTC	A20HTCSF
A30HT	A30	A30C	A30CSF

4.1.5 Optifeed mechanical installation

Most mechanical parts are pre-assembled, making installation quick and simple.

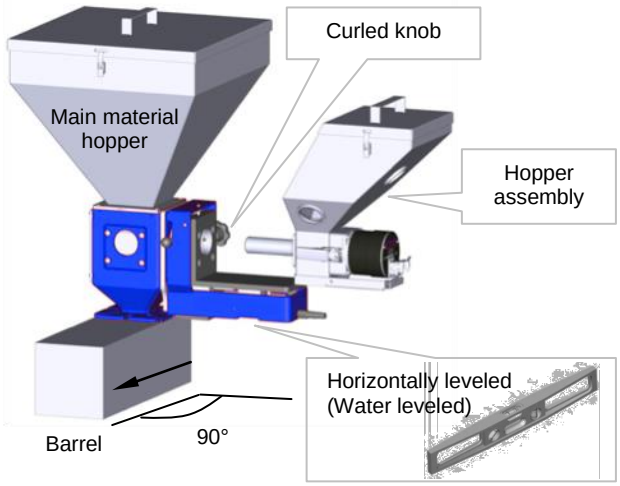
1. When installing a foreign main material hopper on top of a neckpiece, the **top flange** of the neckpiece needs to be adapted. The lid of the neckpiece can be dismounted for easy machining.

2. -Install the neckpiece directly on top of the entrance of the production machine.
   -Install the neckpiece in a **90-degree** angle to the machine barrel. This will optimize the dosing accuracy in relation to vibrations of the production machine.
   -Make sure that the complete unit is mounted **horizontally levelled** and fixed securely.
   -Assure proper grounding to control cabinet, neckpiece and dosing unit



3. Connect the **hopper assembly** to the neckpiece by turning the **curled knob** clockwise. Make sure that the curled knob is tightened firmly.

4. Mount the controller vibration free and conform specified temperatures.



Install the neckpiece in a 90-degree angle to the machine barrel.
As shown in the picture.

4.1.6 Optifeed electrical installation

The Optifeed or MC-BC controller delivered together with the Optifeed is standard equipped with 3 connections:

- Mains power cable
  ⓘ Before switching on the unit for the first time, ensure the mains power voltage being applied is between 80 and 250Vac 50/60Hz.
- Input cable
- Motor cable

ⓘ In case of a multi component system, the controller can be equipped with an additional CANbus cable to interconnect between the Optifeed and other MC-BC's

ⓘ Be aware that the cables will not be influenced by external circumstances as electromagnetic fields!
ⓘ Mount the controller on a place which is vibrations free and not hot!

The Optifeed is standard equipped with 2 connections:

- Loadcell cable
- Motor cable

Connect the loadcell connector to the Optifeed or MC-BC and tighten the locking screws gently. The motor connectors are equipped with a positioning notch and can be connected in one way only. Fixate the connector with the locking mechanism to prevent loosening of the connector due to vibrations.

To connect the input cable, please see Appendix A

Optional are:

- Alarm flash light, complete with cable
- Compressed air solenoid valve complete with cable (for automatic hopper loader)

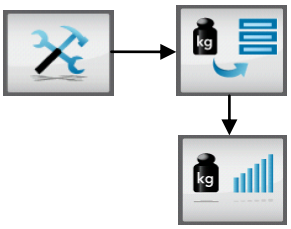
4.1.7 Optifeed loadcell calibration

When using a Optifeed for the first time perform a initial **load cell calibration** as follows:

- The unit must be mounted horizontally (water levelled)
- Avoid vibrations during the load cell calibration. This will influence the calibration.
- Do not touch the unit during load cell calibration.
- When using a slide the whole unit has to be slid in against the neckpiece and fixed.
- When a ME or MV hopper loader is used, be sure it is in place and the tubing is fixed to the tube support and not interfering by any surrounding object.

- Be sure that the Balance load cell is connected to the controller

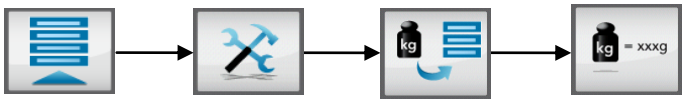
- Enter the “Device configuration” menu and press the loadcell button
- Select calibrate
- Confirm to start calibrating the load cell of the Optifeed (500gr. calibration weight required)
- Follow the instructions on the screen and place the weight when instructed



- After approx. 1 minute the load cell calibration is ready, press confirm to go back to the home menu.

To check if the load cell calibration was OK, the weight check menu will be shown. Check the current object weight (for example the 500gr. calibration weight)

- Recommended is to perform a weight check a regular basis. To do to the WEIGHT CHECK enter the “Device configuration” menu
  and press the loadcell button followed by the weight check button



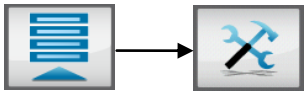
- Place 500 gr. calibration weight on the Hopper and check the displayed weight

If the actual weight is not corresponding with the placed weight, perform a new load cell calibration.

ⓘIn multicomponent setups it can be necessary to use the button to select the unit to be calibrated.

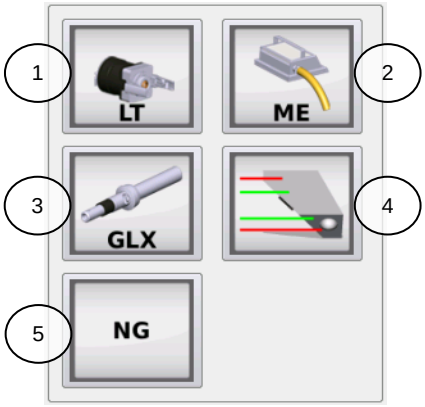
4.1.8 Optifeed device configuration

When the Optifeed is used for the first time, it needs to be configured. The unit is delivered pre-configured, but some settings need to be altered to the process needs.



ⓘ In multicomponent setups it can be necessary to use the button to select the unit to be configured.

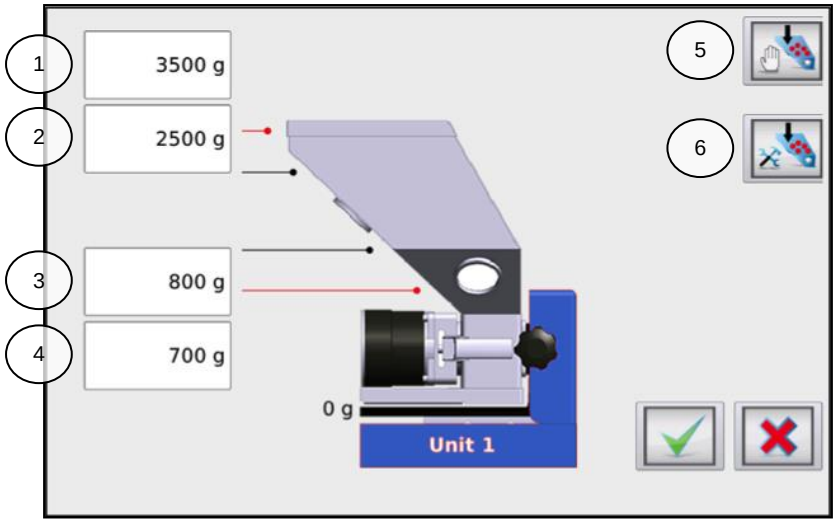
Optifeed settings:



1.	Motor type	LT / HT
2.	Loader type	LOADER OFF / ME / MV / EX
3.	Dosing tool	HX / GLX / GX / A8 / A15 / A20
4.	Hopper levels	See “Hopper level settings”
5.	Material type	NG / MG

ⓘ Do not select HT motor if LT motor is connected.
ⓘ Highlighted is default setting.

Hopper level settings:

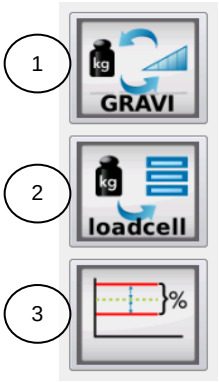


1.	Max fill level (Hi alarm) └ EX: 3500 gr.
2.	Fill stop level └ EX/ME/MV: 2500 gr.
3.	Fill start level └ 800 gr.
4.	Hopper empty (Low alarm) └ 700 gr.
5.	Manual fill
6.	Advanced loader settings

To adjust the hopper levels, determine the Max fill level by manual filling the hopper to the maximum hopper level. Recommended settings for the other 3 levels is 75%, 25% and 10% respectively.
To manual fill the hopper, the manual fill button can be used. The EX knife gate valve will be open or the ME/MV system will be activated as long as the button is pressed.
For more detailed information about hopper loading, see chapter 4.1.10

Advanced loader settings:
When the system is unable to load material the decision can be made to stop the filling cycle after a certain time period and generate an Alarm.

Fill time	Time that MV will vacuum the material per cycle	20 seconds default, MV only
Empty time	Time that MV needs for releasing material into the hopper	5 seconds default, MV only
Alarm time	Maximum fill time period	180s default
Fill alarm mode	Continue filling or stop filling	ON = continue fill, OFF = stop fill



1	Control mode	GRAVI / RPM
2	Loadcell menu	See paragraph 4.1.7
3	Tolerance settings	Deviation alarm: 25% Calibration deviation: 5%

ⓘ Highlight is default setting

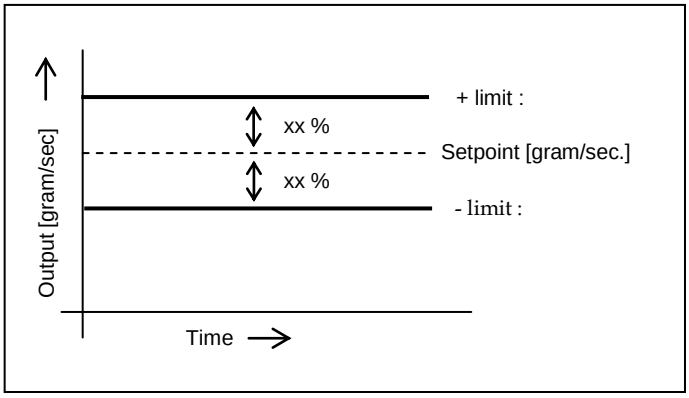
Control mode:
The Optifeed is able to run in Gravimetric mode or in RPM mode. In gravimetric mode, the unit will control its motor speed to achieve an accurate/stable output in gr/sec. In RPM mode, the user can set the motor speed in the production settings; the motor speed will not automatically be adjusted to achieve an accurate/stable output.
In both Gravimetric and RPM mode the automatic filling system can be used.

Tolerance settings:
Deviation alarm:
Setting for the “Maximum deviation exceeded” message.

The Optifeed automatically adjusts his motor speed to the desired set point. The controller is able to detect and alarm when the set point is not reached within a set percentage. If after the normal performed speed adjustments the set point is consistently not reached, the controller will give an alarm signal and message in the display.

If the set point it not reached within the set percentage this can be caused by:
- Partial or complete blockage by sticky or hard flowing material.
- Inaccurate dosing because material is not uniform in size.
- Disturbance of the weight signal, for example by mechanical blocking of the Optifeed load frame.

Deviation alarm: xx% (1-99%)



Example:
The Deviation alarm setting in the configuration menu is default set to 25%
The set point (colour set) is set to : 1,000 gr/sec
-the MAXIMUM limit value will be : 1,250 gr/sec
-the MINIMUM limit value will be : 0,750 gr/sec

When the maximum deviation message (Error 08) appears in the display of the controller it shows the measured deviation in percentage of the set point.

Calibration deviation
The maximum allowed deviation from the Calibration Set point can be set with this Parameter. (For more information see chapter 3.4)

4.1.9 Optifeed production

ⓘThe rotation direction of the dosing at the front view must be to the right

When all configuration settings have been entered production can start. For Injection moulding and extrusion the operating differs. Both processes will therefore be explained separately. The production menu can be accessed by pressing the Home button.

ⓘIn multicomponent setups it can be necessary to use the button to select the unit to be used.

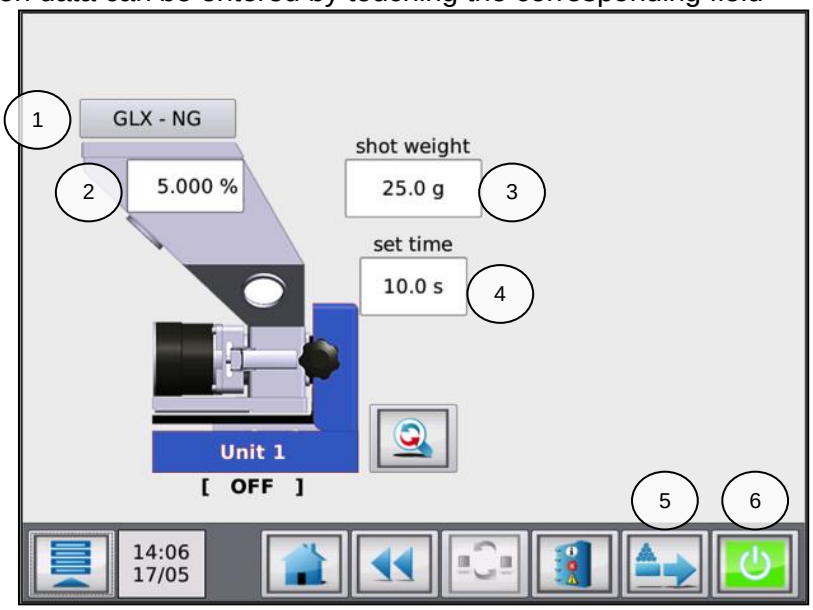
INJECTION MOLDING

Injection moulding / gravimetric mode

Production settings:

The following parameters can be seen in the production screen, depending on operation or settings:

The production data can be entered by touching the corresponding field



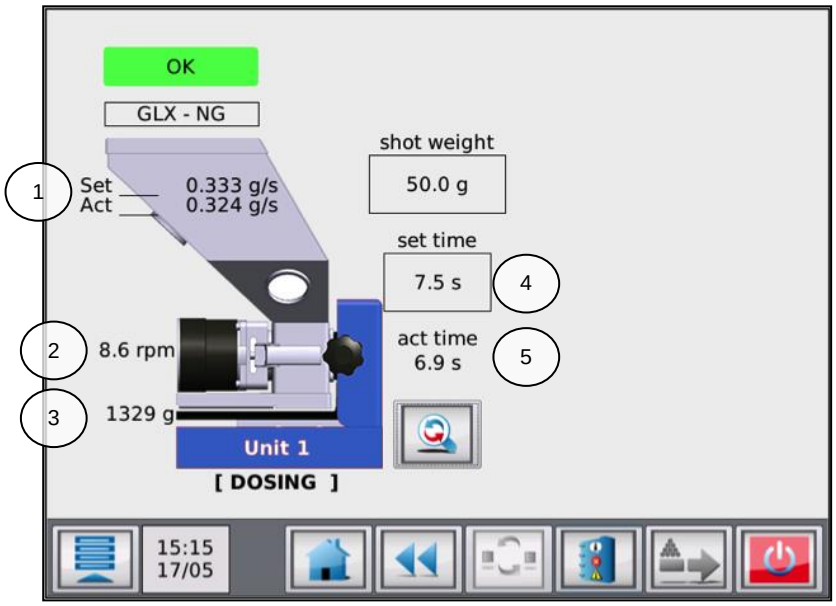
1. **Ref.Curve/material**
   Optifeed pre-programmed curve (dosing tool/granule type), or USER defined curve (material name) is displayed. (not available when recipe function is activated)
2. **Color amount (%)**
3. **Shot weight (gr.)**
4. **Dosing set time (sec.)** ⓘDosing set time only visible in Timer mode, otherwise relay time will be displayed
5. **Prime.** Filling the dosing cylinder before start.
   The prime menu appears by pressing . Settings (speed/time) can be changed. Press confirm to start priming.
6. **Production (Motor On/Off)**
   Press to start dosing. The motor on/off switch will turn from green to red when dosing is started. The start LED blinks when the unit is waiting for an input signal. If the unit is dosing the Start LED lights continuously.
   For stopping production press again. The motor on/off switch will turn to green again.

ⓘ Please note that it is possible that the first dosing(s) are not sufficient, because of the cylinder filling with material. It takes some time to stabilize.

Injection moulding / gravimetric mode

Actual production data:

Using the scroll button , you can switch between production settings and production data.

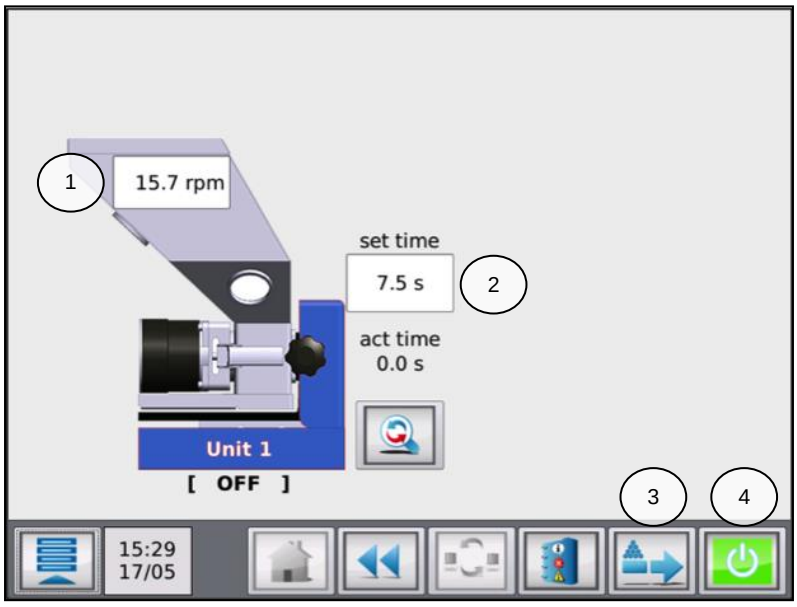


1. **Set and actual output.**
   Set. : Calculated output (gr/sec)
   Act. : Actual colour output (gr/sec)
   ⓘ actual colour output is only visible after the first automatic RPM adjustment.
2. **Speed;** Actual motor speed (RPM)
3. **Hopperweight ;** Material weight in the hopper
4. **Time;** set dosing time (sec), when working TIMER input mode.
   The average dosing time (sec), when working in RELAY input mode.
5. **Act. Time;** count down of the actual dosing time (sec)

Injection moulding / RPM mode

Production settings:

The production data can be entered by touching the corresponding field.



1. **Set motor speed (RPM)**
2. **Dosing time (sec.)**
3. **Prime.** Filling the dosing cylinder before start.
   The prime menu appears by pressing . Settings (speed/time) can be changed. Press confirm to start priming.
4. **Production (Motor On/Off)**
   Press to start dosing. The motor on/off switch will turn from green to red when dosing is started. The start LED blinks when the unit is waiting for an input signal. If the unit is dosing the Start LED lights continuously.
   For stopping production press again. The motor on/off switch will turn to green again.

ⓘ RPM mode needs always a set dosing time, relay function is not functional.

Actual production data:

Using the scroll button , you can switch between production settings and production data.

- **Speed;** Actual motor speed (RPM)
- **Hopperweight ;** Material weight in the hopper
- **Set Time;** set dosing time (sec),
- **Act. Time;** count down of the actual dosing time (sec)

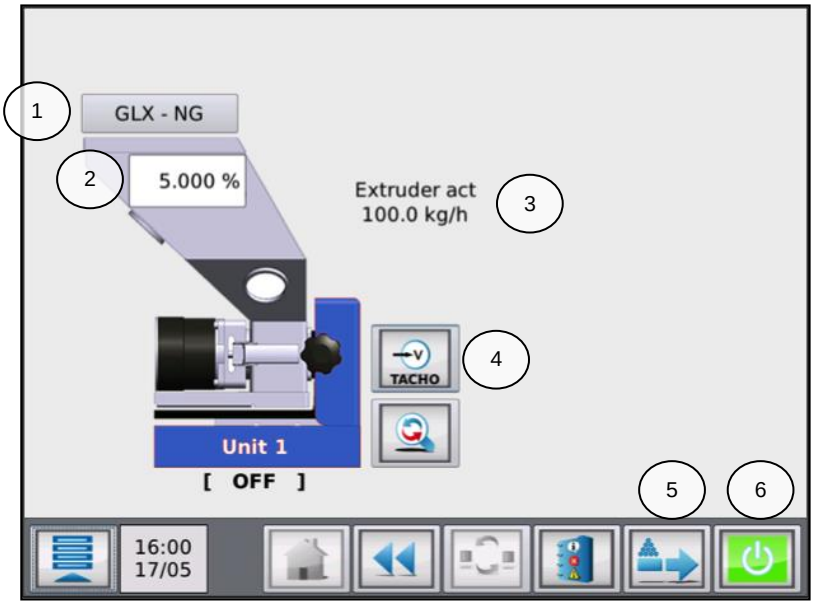
ⓘ Please note that it is possible that the first dosing(s) are not sufficient, because of the cylinder filling with material. It takes some time to stabilize.

EXTRUSION

Extrusion / Gravimetric mode

Production settings:

The production data can be entered by touching the corresponding field.



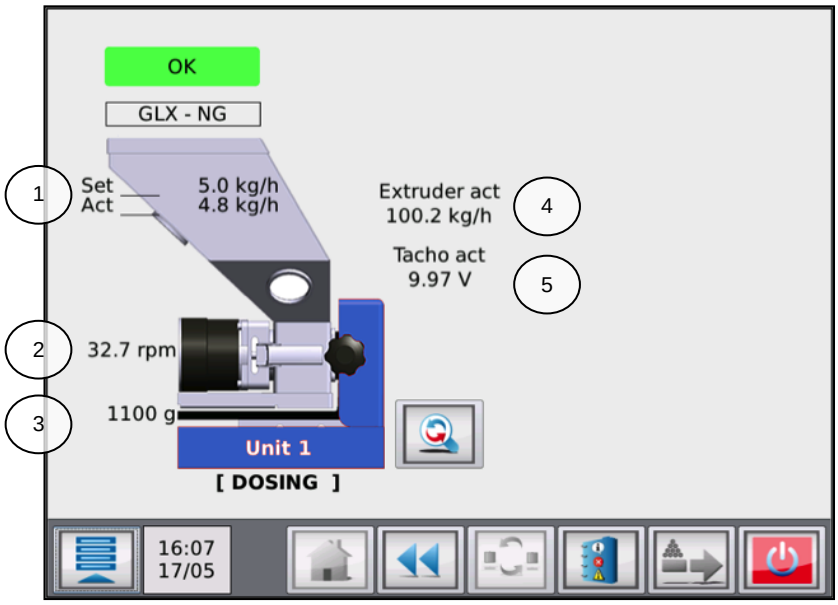
1. **Ref. Curve/material**
   Optifeed pre-programmed curve (dosing tool/granule type), or USER defined curve (material name) is displayed. (not available when recipe function is activated)
2. **Color amount (%)**
3. **Extruder capacity (kg/h)**; In tacho mode the actual capacity is displayed. In Relay mode the extruder capacity can be entered.
4. **Tacho Voltage.** (ⓘ only visible in tacho mode)
   - Manual: Tacho voltage with corresponding extruder capacity can be entered manually.
   - Synchronize: Tacho voltage can be read from extruder and actual extruder capacity can be entered.
5. **Prime.** Filling the dosing cylinder before start.
   The prime menu appears by pressing . Settings (speed/time) can be changed. Press confirm to start priming.
6. **Production (Motor On/Off)**
   Press to start dosing. The motor on/off switch will turn from green to red when dosing is started. The start LED blinks when the unit is waiting for an input signal. If the unit is dosing the Start LED lights continuously.
   For stopping production press again. The motor on/off switch will turn to green again.

ⓘ Please note that it is possible that the first dosing(s) are not sufficient, because of the cylinder filling with material. It takes some time to stabilize.

Extrusion / Gravimetric mode

Actual production data:

Using the scroll button , you can switch between production settings and production data.



1. **Set and actual output.**
   Set. : Calculated output (gr/sec)
   Act. : Actual color output (gr/sec)
   ⓘactual color output is only visible after the first automatic RPM adjustment.
2. **Speed;** Actual motor speed (RPM)
3. **Hopperweight ;** Material weight in the hopper
4. **Actual extruder capacity (kg/h)** ⓘOnly visible in Tacho mode. In Relay mode the set extruder capacity is displayed.
5. **Actual tacho voltage.** ⓘOnly visible in Tacho mode.

Extrusion / RPM mode

Production settings:

In RPM mode the dosing can be done in relay mode or in tacho mode. In relay mode dosing is done at a set rpm. The RPM of the motor has to be entered manually.
In tacho mode the tacho voltage with corresponding RPM can be entered manually. Or with the synchronize function the tacho voltage can be read from extruder and corresponding RPM of the dosing unit can be entered.

Actual production data:

During production the motor RPM, hopper weight, and tacho voltage (only in tacho function) will be displayed.

4.1.10 Optifeed hopper filling.

MANUAL FILLING

The controller automatically detects when the hopper is manual filled.
In the period that the hopper is being filled, the Optifeed is dosing with a fixed RPM, this means the unit runs temporarily volumetric. As soon as the hopper filling is ready, the Optifeed immediately continues to work gravimetric.

AUTOMATIC FILLING

ⓘ Only use Optifeed hopper loaders to fill the hopper automatically.
Foreign hopper loaders can influence the gravimetric function of the dosing.

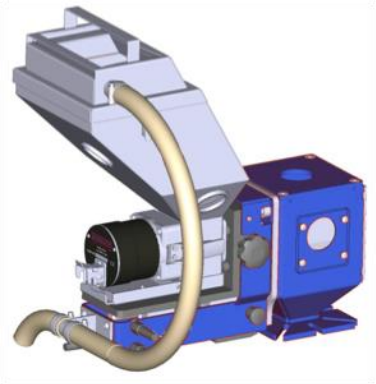
Introduction
Optifeed dosing units are capable of handling a variety of dry materials. Two different filling systems are available depending on the material properties.
-The Optifeed Ejector (ME) system for dust-free or nearly dust-free materials
-The Optifeed Vacuum (MV) system for materials that are NOT entirely dust free.
-The Support frame for external / foreign hopper loaders (EX)

The ME and MV systems are both driven by low-pressure compressed air and mounted directly on top of the hopper lid of the Optifeed dosing unit. The Optifeed controls the operation of the ME or MV systems.

All parts are aluminium or stainless steel and are virtually maintenance-free. Only the filter needs to be cleaned periodically. To increase reliability and safety, there are no moving parts except for the pneumatic operated closing valve of the MV system.

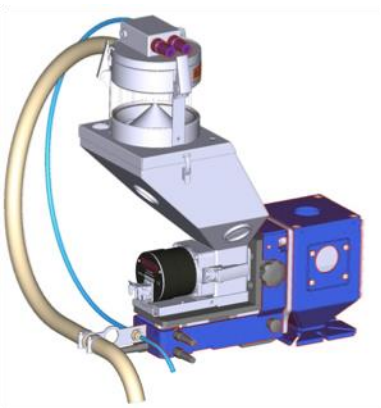
How the ME works
The ME system blows the material from the bag, drum or container into the hopper of the dosing unit. The hopper lid of the housing has a simple and easy-to-clean dust filter to keep any dust particles in the hopper.
The system is triggered by the filling start weight (4.1.8 Hopper Levels). This parameter also generates a low-level alarm if the hopper is empty.

ME hopper loader

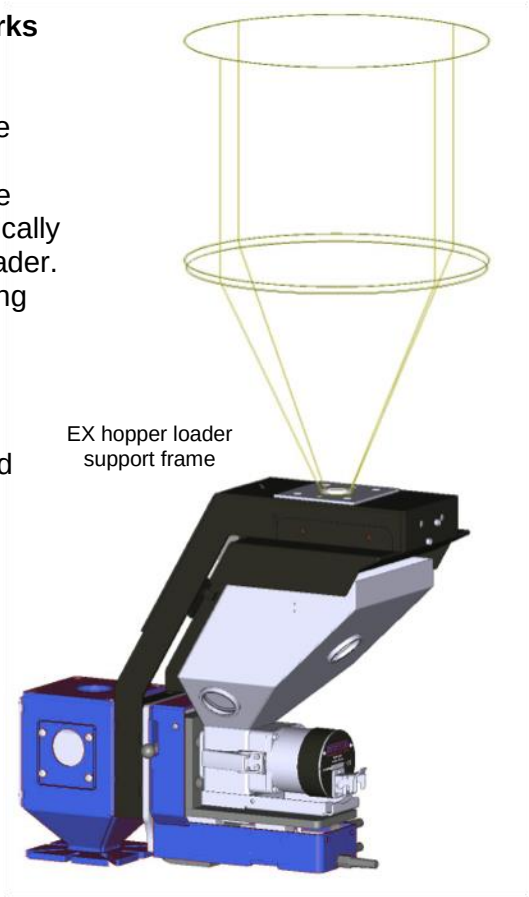


MV hopper loader

How the MV works
The MV system uses a 3-stage vacuum generator driven by compressed air to create a vacuum that draws material into a chamber that closes. Once the chamber is filled with material, the cone that closes the chamber will open and the material will be discharged into the hopper.
The system is equipped with a superior filter to ensure that the finest particles (> 5micron) stay in the system and are not released into the atmosphere. This makes the MV system the most practical and user-friendly system for both powders and granules.

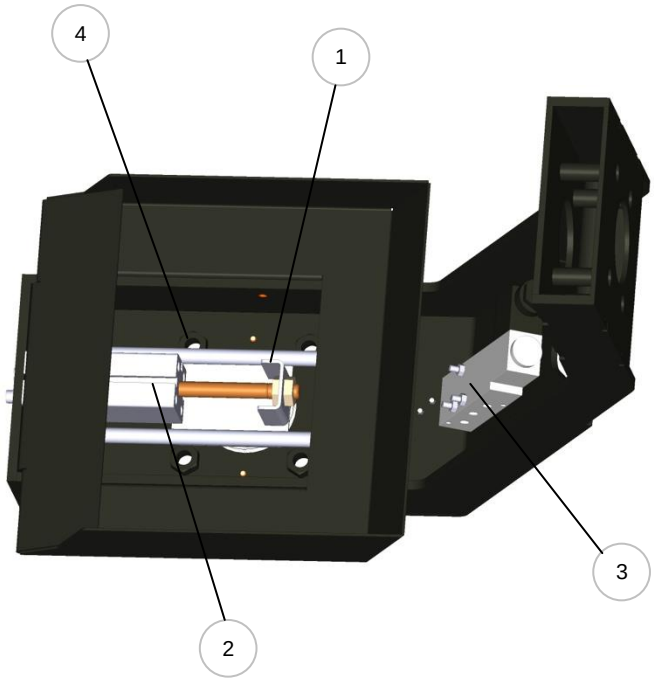


How the EX (support frame for External hopper loader) works
The function of the support frame is to use a foreign hopper loader in combination with the Optifeed. The support frame is equipped with a knife gate valve for filling the hopper. The valve is normally closed. If the filling start level is reached (default 800gr.) the valve opens and the hopper is filled until the EX-H level (default 2500gr.). Then the valve will close automatically , so the support frame works independently from the hopper loader. If for some reason the weight reaches the EX-HH level a warning will be given. This can happen if for example the valve doesn't close.


EX hopper loader support frame

⚠ Do not take the dosing unit away before the compressed air of the valve is disconnected and press **STOP** on the controller to disable the valve because the knife gate valve can move!

ⓘ It could be necessary to use an customer specific intermediate plate between the hopper loader and the support frame to make a good fit.



1	Knife gate valve
2	Cylinder for open/close the valve
3	Solenoid valve
4	Connection Nuts (M10) for hopper loader mounting

General
ⓘThe hopper loader is only activated when the motor is On.
ⓘ Emergency stop.
To stop the hopper loader the motor must be switched off. In the device configuration menu the ME/MV/EX can then be switched off.

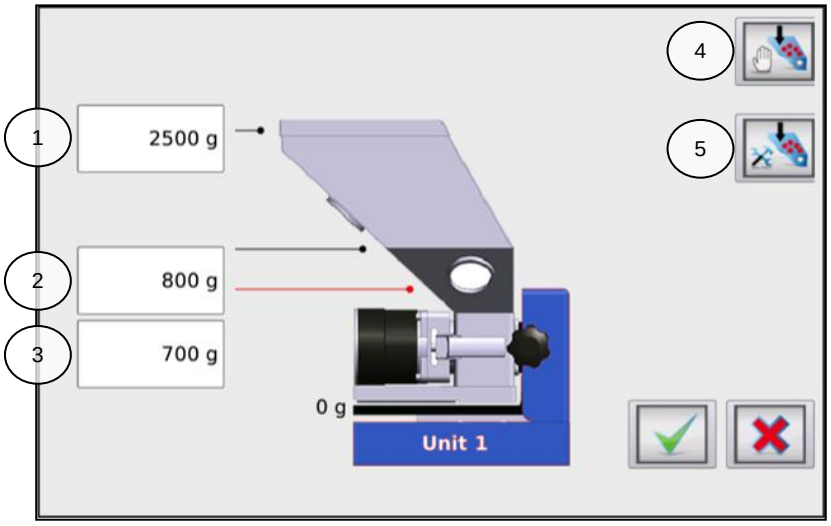
Hopper loader settings
This part of the manual describes how to configure the hopper loader. For further technical information about the hopper loader consult the specific hopper loader manual.

There are four ways to fill the hoppers:
1. Manual
2. Automatic with ME hopper loader
3. Automatic with MV hopper loader
4. Automatic with EX external hopper loader in combination with the support frame.

Manual
Open the hopper lid and fill the hopper by hand (filling will be detected automatically).
The warning message “Low hopper level” appears when the material level in the hopper is below the set level. (default 800 gr.)

The levels settings for the hopper loader can be checked and adjusted if necessary. Enter the device configuration (4.1.8 Hopper Levels) menu and press. The available settings vary per loader model.

ME hopper loader (Optifeed hopper loader operated by compressed air)

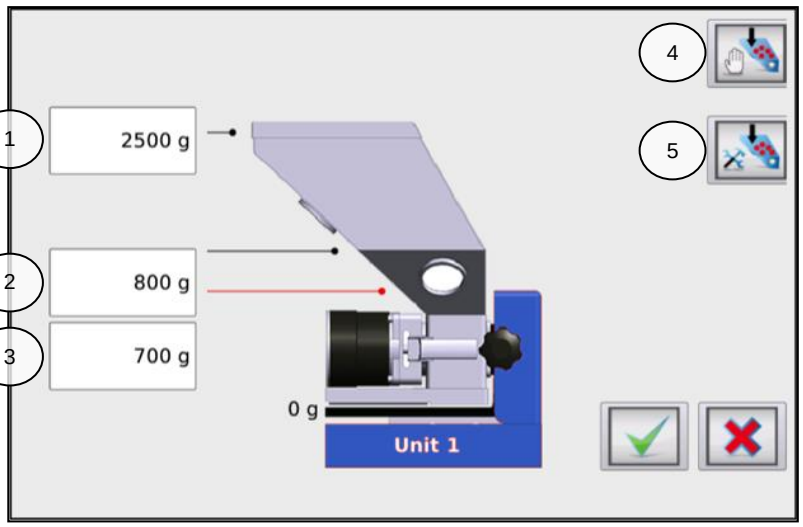


1. = Max filling level
2. = Hopper loader start level
3. = Hopper empty level
4. = Manually activate the hopper loader.
   The Manual filling function can for example be used to fill the hopper before start of production.
5. = Advanced loader settings.

In the advanced loader settings menu alarm time and alarm mode can be changed.

Alarm time: Fill Alarm [sec.], if the hopper weight is not above the 800gr. within this time, the alarm starts.
Alarm mode: ME hopper loader is ON / OFF during fill alarm.
ON = ME Hopper loader stays activated during a filling alarm.
OFF = ME Hopper loader will be deactivated during a filling alarm.

MV hopper loader (Optifeed hopper loader operated by vacuum)



1 = Max filling level
2 = Hopper loader start level
3 = Hopper empty level
4 = Manually activate the hopper loader.
The Manual filling function can for example be used to fill the hopper before start of production.
5 = Advanced loader settings.

In the advanced loader settings menu Fill time, empty time, alarm time and alarm mode can be changed.

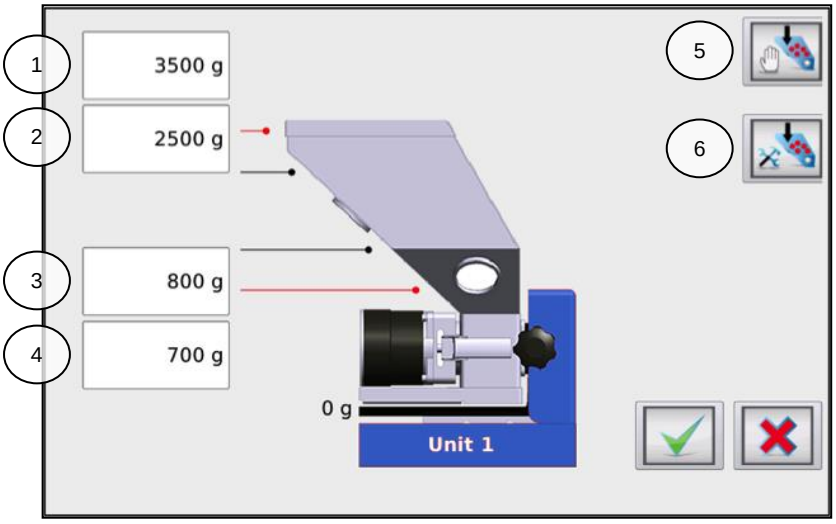
Fill time: Fill time [sec.], during this time the MV system sucks material into the vacuum chamber.

Empty time: Empty time [sec.], during this time the cone that closes the chamber will open and material falls down into the hopper of the dosing unit.

Alarm time: Fill Alarm [sec.], if the hopper weight is not above the 800gr. within this time, the alarm starts. The alarm time cannot set lower than the fill time.

Alarm mode: MV hopper loader is ON / OFF during fill alarm.
ON = MV Hopper loader stays activated during a filling alarm.
OFF = MV Hopper loader will be deactivated during a filling alarm.

EX hopper loader (support frame for external hopper loader)



1 = The *EX-HH level* is the Highest level. If this level is reached a “High High level” warning appears.
2 = *EX-H level* is the level where the knife gate valve will be closed again.
3 = Filling start level
4 = Hopper empty level
5 = Manually fill.
6 = Advanced loader settings.

In the advanced loader settings menu alarm time and alarm mode can be changed.

Alarm time: Fill Alarm [sec.], if the hopper weight is not above the 800gr. within this time, the alarm starts.

Alarm mode: EX hopper loader is ON / OFF during fill alarm.
ON = EX Hopper loader stays activated during a filling alarm.
OFF = EX Hopper loader will be deactivated during a filling alarm.

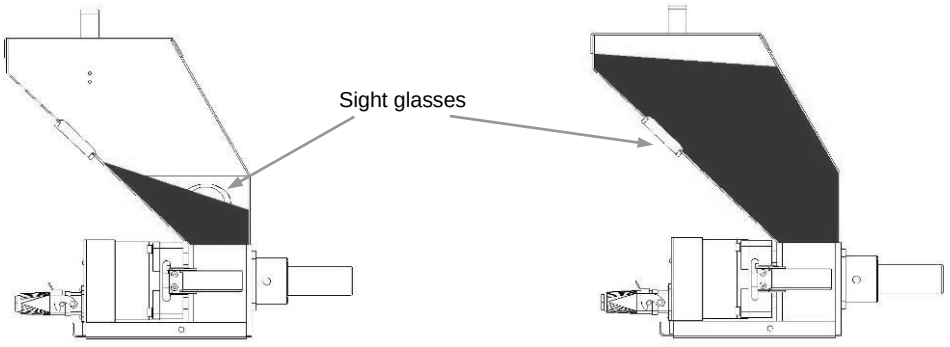
Output signals
During fill time there will be a 24VDC signal between connection 29 and 30 on the main board to activate the pneumatic solenoid valve.

When the Fill Alarm is activated there will be a 24VDC signal between connection 27 and 28 on the main board to activate the flash light. The controller itself gives a beeping signal and the alarm LED will light up.

GENERAL RECOMMENDATIONS FOR OPTIMAL HOPPER FILLING

To guarantee the optimal working of the gravimetric Optifeed dosing unit it is important to use the correct rate of hopper filling. The higher the output of the dosing unit (kg/h), the more important becomes the rate of hopper filling.

During hopper filling, the electronics of the Optifeed controller recognize automatically that the hopper is being filled. This automatic filling detection is working for manual filling of the hopper and filling with an automatic hopper loader.
In the period that the hopper is being filled, the Optifeed is dosing with a fixed RPM, this means the unit runs temporarily volumetric. As soon as the hopper filling is ready, the Optifeed immediately continues to work gravimetric.
Because the Optifeed is working volumetric during a hopper filling it is recommended to reduce the amount of filling cycles. Or in other words, to enlarge time between a filling moment and the next filling moment. This can be performed when using the correct settings of the “Filling start level” and the “Filling stop level”.
When the unit is started with the Autostart function enabled and the unit is switched OFF and ON again the filling will start automatically if the hopper weight is too low.



Filling start level

The moment when the automatic filling starts depends on the entered start level:

Filling start : xxx gr. *(Configuration menu*)

Filling stop level

Filling stop level is depending on the entered stop level for the ME-MV-EX system:
Filling stop : xxx gr.

For the MV-system:
Filling stop: xxx gr.

(hopper loader menu)

Recommended settings for ME hopper loader:

-Use for the filling start weight a level like shown in the filling start figure above, when using a to high weight level the amount of filling cycles will increase.
-Use a fill stop weight so that the material covers at least the sight glass in the back of the hopper. Overfilling of the hopper should be avoided

Recommended settings for MV hopper loader

-Use for the filling start weight a level like shown in the filling start figure above, when using a too high weight level the amount of fill cycles will increase.
-Use a fill time so that the vacuum chamber of the MV-Loader is filled almost completely. Overfilling of the vacuum chamber should be avoided.
- Use for the empty time not a longer time that necessary but a to short empty time can cause decrease of the capacity of the MV-hopper loader.
- Use a fill stop weight so that the material covers at least the sight glass in the back of the hopper. Overfilling of the hopper should be avoided

Recommended settings for EX hopper loader (support frame):

-The Volume of the hopper is 6 litres. To set the EX-H level (stop filling). It is recommended to take a safety margin to prevent the hopper of overfilling.
- EX-H (gr.) = 5 (litre) x bulk density (gr./litre)
For example: If the bulk density = 700 gr./litre, the EX-H should be set to 700 x 5 = 3500 gr.
The EX-HH (gr.) should be set higher, recommended 700 x 6 = 4200 gr.
Overfilling of the hopper should be avoided because it influences the measurement.

5 Alarms

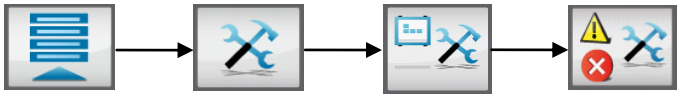
5.1 General

To reset an alarm / warning during production press to Stop dosing or / and confirm .
When an error occurs using the Optifeed, the display will indicate an error code and description.
Together with the displayed error an output contact will be switched.
The controller itself gives a beeping signal and the alarm LED will lighten up.

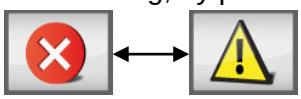
We distinguish Warning and Alarm:
Warning: Alarm / warning output is ON, but the dosing unit continues running
Alarm: Alarm / warning output is ON and the **dosing unit stops running**

5.2 Configuration

Free programmable errors can be configured to an **Alarm** or **Warning**.
For setting the free programmable outputs into alarm or warning, enter the ALARMS menu. The alarm menu can be accessed in the advanced settings menu.



In the alarm configuration menu a list of warnings/alarms is displayed

Here you can select if the error will act as an alarm or warning, by pressing the warning symbol you can toggle between alarm and warning 

5.3 History

The alarm history can be opened through the home screen by pressing (not in operator mode). A list with the alarms that occurred will appear.

We have the following Errors:

Code	Warnings	Description
1	Filling system unable to load material	Fill system is not working correct
2	Low level	Material is below the hopper start filling weight
3	Empty level	Material is below the hopper empty weight
4	High-High level	Hopper weight has reached the EX-HH level
5	Minimum motor speed (< 0,1 RPM)	Calculated motor speed is too low
6	Maximum RPM exceeded, change dosing tool for higher capacity	Calculated motor speed is too high
8	Maximum deviation exceeded!	The deviation of the material output is too high
9	Master /slave connection failure!	Connection failure between multi component controllers

Code	Alarms	Description
100	Motor connection failure!	Motor not connected / Motor or connection damaged
102	Load cell connection failure!	Load cell connection is not correct

5.4 Warnings

All **warnings** are self-eliminating.
It is possible to cancel a warning, but when the error remains, the warning will return after 60 seconds. This gives the operator the time to solve the problem without having the alarm on.

Error 01	**"Filling system unable to load material"** If this warning appears the alarm time (ME hopper loader) or alarm cycles (MV hopper loader) are exceeded. - Check if there is enough material. - Check if the material is stuck somewhere. - Check the operation of the hopper loader. - Check the hopper loader settings.
Error 02	**"Low level!"** **"Level is less than xxx g"** If this warning appears the material in the hopper is below the hopper low weight (800 gr.) In DEVICE CONFIGURATION this setting can be changed. - Check if there's enough material in the hopper. - Check the hopper Low setting in DEVICE CONFIGURATION <menu> - Check if the hopper loader is working right.
Error 03	**"Empty level"** **"Level is less than xxx g"** If this warning appears the material in the hopper is below the hopper empty weight (700 gr.) In CONFIGURATION <menu> this setting can be changed. - Check if there's enough material in the hopper. - Check the hopper empty setting in CONFIGURATION <menu> - Check if the hopper loader is working right.
Error 04	**"High High level"** **"Level is higher than xxx g"** - Check if the knife gate valve is in closed position. - Check if the knife gate is sliding. - Check if the parameters EX-H level and EX-HH level are set OK.
Error 05	**"Minimum motor speed (< 0,1 RPM)"** Calculated motor speed is lower than the minimum of 0,1 RPM - Check if there's enough material in the hopper. - Check the production settings. - Decrease the dosing time (if possible) - Take another dosing type with lower output, for example a GLX-cylinder - Check the rotation direction of the dosing cylinder. Front view to the right
Error 06	**"Maximum RPM exceeded, change dosing tool for higher capacity"** **"Change dosing tool for higher capacity"** Calculated motor speed is higher than the maximum of 200 RPM - Check the material output on 200 RPM. - Check the production settings. - Increase the dosing time (if possible) - Take another dosing type with higher output, for example a feed screw A20
Error 08	**"Maximum deviation exceeded"** If this warning appears the dosing output (grams/sec) is consistently not within set percentage. See page 18 for more information.
Error 09	**"Master/Slave connection failure"** Connection failure between multi component controllers - Check wiring.

5.5 Alarms

Error 100	**"Motor connection failure"** Motor connection is not correct. - Make sure the motor is connected. - Check cable and connectors for damage.
Error 102	**"Loadcell connection failure"** -Load cell connection is not correct. -Load cell connector is not connected to the controller.

6 System performance

6.1 General

System performance can be characterized by the time it takes the unit to reach the desired set point, the accuracy of the set point and the regularity of the material output.

The algorithm is self-adjusting to the conditions and because the conditions vary, it cannot be predicted how long it will take the unit to adjust itself and reach a set point with certain accuracy.

The following variables influence system performance:

Material properties. Easy flowing, non-sticky and non-static material that comes in the form of small granules or powder can be dosed very accurate and regular. The accuracy and regularity of material output drops with increased granule size. However this is only a problem with extreme low outputs.

Periodical cleaning of the dosing cylinder and seals is necessary for proper operation.

Extreme vibrations and shocks influence system performance noticeably. Normally the system will be able to compensate for vibrations and shocks.

The dosing algorithm needs a certain time to weigh material loss and adjust the RPM accordingly. This time depends largely on the set point and the above mentioned two variables. The system constantly adjusts itself to reach the best possible accuracy for current conditions. Over time it can reach accuracy within ± 1%.

Under “normal” circumstances the unit will be more accurate than 10% after the first adjustment of the RPM.

Before the unit makes its first RPM adjustment it might be running already very close to the desired set point because it uses a cylinder and material reference system to determine the first RPM setting. This accuracy however cannot be guaranteed because material properties can vary substantially from material to material.

An unstable relay or tacho signal has a negative effect on the accuracy, repeatability and speed of the system because it will adjust to these parameter changes.

A long cycle time combined with low dosage per shot can result in a slow system.

6.2 Reset regulation

- Changing one parameter during production will cause the Optifeed to adjust to the changes but it will not reset the regulation totally.
- Changing more production parameters during production within 10 seconds after each other will cause the Optifeed regulation to reset. This is necessary for the system to adjust quickly to these big changes in the settings.
- Switching the power OFF and ON again will also cause the regulation to reset.
- Motor OFF and ON again will only cause the regulation to pause. The start-up RPM will be the same as the last RPM before the stop.
- Changing one parameter with motor OFF causes total reset of the regulation.
- With auto start = ON (CONFIGURATION <menu>) the motor follows the last status (motor Standby or motor Stop status) and causes total reset of the regulation.

7 Trouble shooting

Problem: The dosing system does not come into specification or a Maximum deviation alarm occurred.

Possible causes:

1. Check if all cables are connected correctly.
2. Check if the transport protection is removed from the load cell safety bolt.
3. Check if the hopper assembly is fixed tightly to the weighing platform and that the neckpiece is fixed tightly to the production machine.
4. Check if the dosing cylinder is tightly fixed to the motor shaft.
5. Excessive build-up of material on the dosing cylinder may have impact on proper dosing. To avoid this, be sure that the seals and dosing cylinder are clean.
6. Check if there is no tension on the cables connected to the weighing platform.
7. Use the weight check function with the reference weight to determine the correct function of the weighing system.
8. If the weight check gives the correct result, check if the material flow into the cylinder has been blocked.
9. Another cause may be an obstruction to the weighing system. Check if there is at least ≈ 1mm space between all the pointed screws and the load cell frame or platform and that there is no material or dirt blocking the movement.
10. In case of a water cooled neckpiece, check if there is material build up around the dosing cylinder and the water cooled pipe that can obstruct the free movement of the weighing system.
11. Check if the input signal is stable.
12. If none of the above causes the problem, recalibrate the system and try the weight check again.

Problem: The dosing system does come into specification but seems to be slow.

Possible causes:

1. Extreme vibrations and shocks to the system.
2. Extreme low Set point. See Chapter 7: SYSTEM PERFORMANCE
3. Check in case of use of an automatic hopper loader if the hoses are connected in the right way.

Problem: The input/start-signal is connected but the unit does not recognize this start signal.

Possible causes:

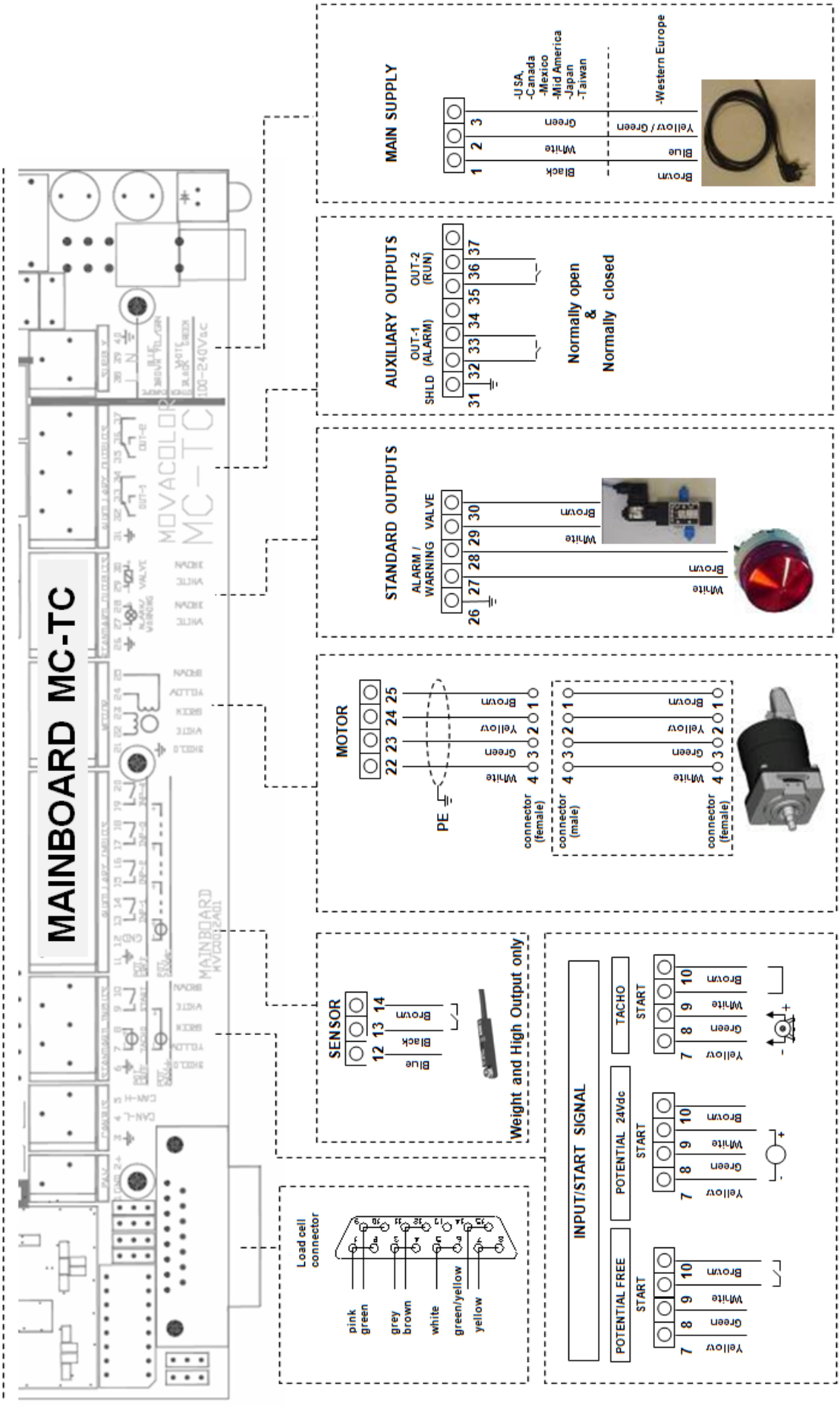
1. Check if the correct wires are connected for potential free contact, potential contact or tacho. Also check if the + and – side are connected correctly.
2. Automatic fuse is activated, this can for example happen when there was a short-circuit at the input connection. To deactivate the automatic fuse the controller needs to be switched OFF for a while and ON again, but first check and repair the short-circuit.

Problem: The hopper weight is not stable.

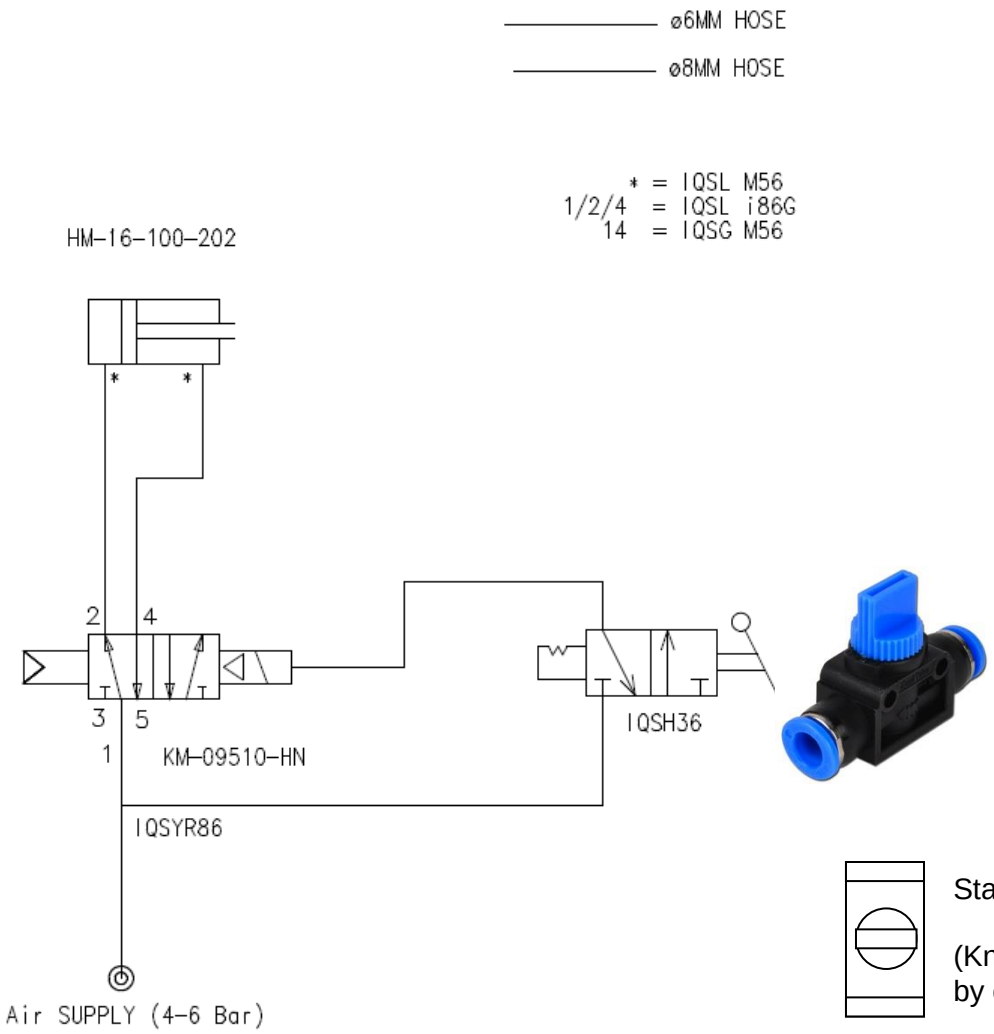
Possible causes:

1. Check if the weighing signal is not influenced by external circumstances, for example that the loadcell cable passes near to electromagnetic fields or electro motors.
2. Extreme vibrations and shocks to the system.
3. Check if there is no obstruction to the weighing frame.
4. Check in case of use of an automatic hopper loader if the hoses are connected in the right way.

APPENDIX A: Optifeed Wiring Diagram

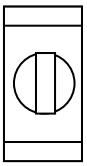


APPENDIX B: MC Weight MCHO Pneumatic Diagr.



Standard operation.

(Knife gate operated by controller)



Manual (override) operation.

(Knife gate open)

APPENDIX C: Optifeed Technical Specifications

Controls:
Set and actual % setting for injection moulding and extrusion
Extrusion control by relay or tacho
Injection moulding control
Automatic metering time synchronization or by manual timer
Manual speed and time setting
Speed: Manual setting from 0,1 to 200 RPM max, in increments of 0,1 RPM.
Time: Manual settings from 0,1 to 999 sec in increments of 0,1 sec.
3 keyboard lock levels
Integrated hopper loader controller

Monitoring/System Information/External communication

External Communication:	PC link using TCP/IP internet protocol ModBus TCP/IP Optional: Profibus DP slave
Alarm:	2 user alarm levels

Specifications/Standards & Directives/ Technical data:

Power supply:	Operating power from 95 VAC to 250 VAC, 50 and 60 Hz by integrated automatic voltage selector
Power consumption:	150 Watt maximum
Stepper motor:	(1,8degr/step) max 2A or 4A(high output) at 40 Volt.
Operating Temperature:	-20 to +70 degr. C.
Load cell and electronics:	20 bits A/D resolution with a full digital filtering

Input signal(s):

Injection moulding:	Start/Stop trigger input, potential free or 24VDC*
Extrusion:	Start/Stop trigger input, potential free or 24VDC* Tacho input 0..30VDC

* Note potential contact
Guaranteed OFF: 0-8VDC
Guaranteed ON: 18-30VDC

Output(s):
-Stepper motor max. output 2A or 4A(high torque) at 40VDC
-Solid state 24VDC/0.5 A output for valve hopper loader
-Solid state 24VDC/0.5 A output for external warning
-Relay for alarm level (max. 230Vac/30Vdc, 5A)
-Relay for running contact (max. 230Vac/30Vdc, 5A)
-Maximum total output power: 12 Watt (Valve output + alarm output)

Standard Directives:
Protection class: IP-50
According to CE standards

Safety
- In case of overload due to short-circuit or incorrect connection, the power supply automatically shuts down.
- Opto insulated start input for connection to production machine.

Optifeed
Machine connection flange:
Standard flange NSt40-neckpiece with cleaning opening.
Inlet/outlet ø50mm/□40mm, steel epoxy coated RAL 3002

Load frame:

- Balance frame:	Steel, epoxy coated RAL 3002
- Weighing frame:	Aluminium, epoxy coated RAL 9005
- Loadcell:	Nominal Load: 20 kg. Temp. Compensated Temp. Range: -20…+60 gr. Celsius Protection level: IP63 EN60529

Optional parts
- External Alarm Flash light.
- External Alarm Siren.
- Profibus DP slave module

APPENDIX D: Optifeed. Declaration of Conformity

DECLARATION OF CONFORMITY

(According to 2006/42/EC)

Manufacturer's name	**:**	**TSM Control Systems**
Address	**:**	**The Demesne, Dundalk, Co. Louth, The Netherlands**

Declare under our sole responsibility that the product:

Name	**:**	**Optifeed**
Model	**:**	…….
Year	**:**	**20…..**
Serial nr.	**:**	…….

- **Complies with the definition of the Machine Directive (2006/42/EC), and complies with the national legislation to enforcement of this directive;**

- **complies with the requirements of:**
  Low Voltage Directive (2006/95/EC)
  EMC Directive (2004/108/EC)

- **complies with the following standards or other normative documents:**
  NEN-EN 12100:2010 Safety of machinery, general principles for design, risk assessment and risk reduction.

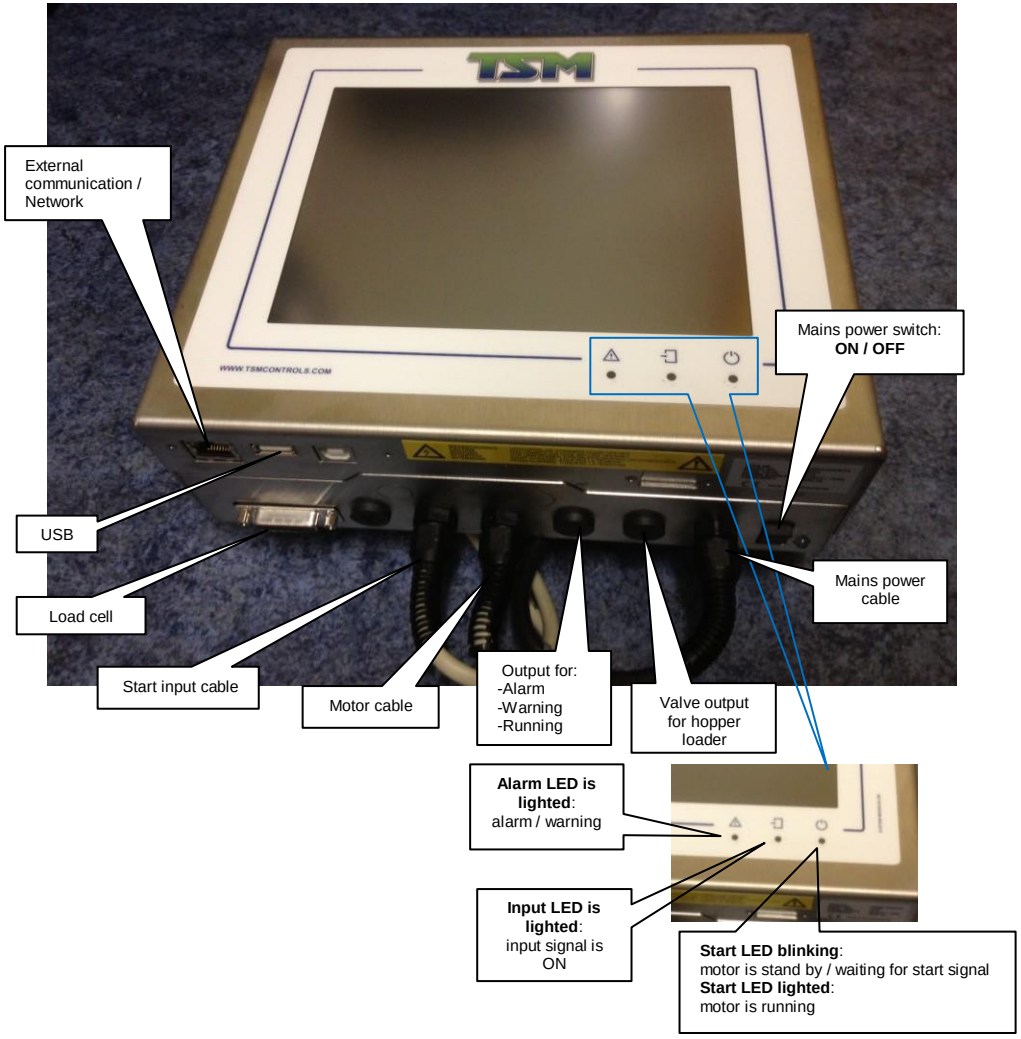
(Signature) **Place: Dundalk, Ireland**

Managing Director **Date:** …….

OPTI-FEED Quick Reference 1.0 UK.00

Operation Reference

For more detailed information please consult the User Manual


External communication / Network
Mains power switch: ON / OFF
USB
Load cell
Start input cable
Motor cable
Output for: -Alarm -Warning -Running
Valve output for hopper loader
Mains power cable
Alarm LED is lighted: alarm / warning
Input LED is lighted: input signal is ON
Start LED blinking: motor is stand by / waiting for start signal
Start LED lighted: motor is running

GENERAL

1. Operation software version V1.00r, production date December 2011.
2. Connect motor and load cell before switching on the controller.
3. All changes have to be confirmed with

START UP

After switching on the mains power of the OPTI-FEED, the screen will remain black for about 15 seconds, followed by various screens where the last is showing the software version. After about 90 seconds the home screen appears and the unit is ready for operation.

LOGIN ➔

The OPTI-FEED has 3 user levels defined:

	User Level	Access level
1.	Operator	production settings
2.	Tooling	same as operator + material pre-calibration and access to the device configuration menu.
3.	Supervisor	same as tooling + access to the Advanced Configuration menu and the Alarm Log.

When entering a wrong password, user level will be set automatically to operator level.
In **OPERATOR LEVEL** the following functions are available:

- **PRODUCTION ----------**
- **PRIME ---**
- **LOGIN ----------**

PRODUCTION ➔

The following parameters can be seen in the production screen, depending on operation or settings, (made in supervisor mode):

Injection molding

Recipe:	Name of the Recipe
Set speed:	Rotating speed of the motor [RPM mode]
Dos. Time:	Dosing time (sec.) [Timer mode]
Material:	Name of material calibration
Color%:	Color amount (%)
Shot wth:	Shot weight (gr.)

Extrusion

Recipe:	Name of the Recipe
Set speed:	Rotating speed of the motor [RPM mode]
Tacho:	Tacho voltage (V) settings
Material:	Name of material calibration
Color%:	Color amount (%)
Ext. cap:	Maximum extruder capacity (kg/hr)

Production (Motor On/Off)

If the cylinder needs filling before production press and confirm . Press to start production. The start/stop button will turn from green to red to indicate that the unit has been activated.
Press again to stop production. The start/stop button will turn from red to green.
When the unit is started, the actual production data will be shown when the Toggle button is pressed.

The start LED blinks when the unit is waiting for an input signal. The unit is dosing if the Start LED lights continuously.

HOPPER LOADER ➔

The Hopper loader can be selected in the device configuration menu (supervisor mode). Following parameters can be set in the loader settings menu

Available settings for ME hopper loader (TSM hopper loader operated by compressed air) **MV hopper loader (Movacolor hopper loader operated by vacuum)**

1. = Max filling level (2500gr*)
2. = Hopper loader start level (800gr*)
3. = Hopper empty level (700gr*) * = default settings

Manually activate the hopper loader. The manual filling function can be used to fill the hopper before start of production.
Press for the advanced loader settings

Advanced loader settings for ME:

ME alarm time:	Alarm time (sec.) Time between hopper empty weight (CONFIG) and start of alarm, alarm time > fill time.
ME alarm mode:	ME hopper loader is ON / OFF during fill alarm.

Advanced loader settings for MV:

MV Fill time:	Time the MV system sucks material into the vacuum chamber.
MV Empty time:	Opening time off the cone for material to fall down into the hopper of the dosing unit.
MV Alarm time:	if the hopper weight is not above the 800gr. within this time, the alarm starts.
MV Alarm mode:	MV hopper loader is ON / OFF during fill alarm.

Available settings for EX hopper loader (Support frame for external hopper loader)

1	= The EX-HH level is the Highest level. If this level is reached a “High High level” warning appears.	(3500gr*)
2	= EX-H level is the level where the knife gate valve will be closed again.	(2500gr*)
3	= Filling start level	(800gr*)
4	= Hopper empty level	(700gr*)

Manually fill the hopper. The manual filling function can be used to fill the hopper before start of production.
Press for the advanced settings

EX alarm time:	if the hopper weight is not above the 800gr. within this time, the alarm starts.
EX alarm mode:	EX hopper loader is ON / OFF during fill alarm.

Installation Reference OPTI-FEED

For more detailed information please consult the User Manual

GENERAL INFORMATION

- Use the equipment only for what it is designed for. The metering of dry additives!
- Before switching on the unit for the first time, ensure that the main power voltage being applied is between 80 and 260Vac.
- Always switch off the Movacolor control cabinet and disconnect from electrical power before performing maintenance.
- The CE symbol certifies that the machine conforms to the European Union regulations on minimum safety standards.
- Make sure all parts are securely fixed to your extruder or injection molding machine.

LOGIN ➔ *Operator / Tooling / Supervisor level*

The OPTI-FEED has 3 operation / user levels defined:

User level	Default code	Access
• Operator	0000	production settings / Login
• Tooling	1111	same as operator & hopper loader settings / weight check / load cell calibration / consumption / material calibrations / job functionality.
• Supervisor	2222	same as tooling & advanced device configuration / alarm configuration / alarm history / file management .

Password forgotten: Consult user manual

Entered the wrong password, user level will be set automatically to **operator** level.

CONFIGURATION ➔ *Tooling + Supervisor level*

parameters will be (in)visible in case they are not relevant.
Explanation of the parameters:

- Motor type: LT is Low Torque motor / HT is High Torque motor
- Cylinder type: Type of dosing cylinder / feed screw (see manual for all types)
- Material type: Type of material, normal granules (NG) and micro granules (MG)
- Fill. System: Filling system, OFF / ME / MV / EX
- Loader settings: Level settings of the loader + advanced loader settings
- Control mode: Gravimetrical mode (GRAVI) or Volumetric mode (RPM)
- Loadcell: Perform a loadcell calibration and check the weight
- Tolerance settings: Deviation alarm % setting / Calibration deviation % setting.

ADVANCED CONFIGURATION ➔ *Supervisor level*

- Language: Standard language is English. On request also different languages are available.
- Prod. Mode: Extruder (EXT) or injection molding (INJ)
- Input mode: Type of input signal. Relay, Timer or Tacho (only with extruder)
- Recipe: Enable / disable recipe functionality
- Start user: User level to start up with, when switching on the controller's main power
- Tooling password: Password for Tooling user level, 4 numerals, default 1111
- Supervisor password: Password for Supervisor user level 4 numerals, default 2222
- IP: IP-address for use in a network environment
- Modbus unit: Unique identity when used in modbus network
- Date/Time: Actual date and time; (dd / mm / yy) (hh / mm / ss)
- Number of controllers: Number of controllers:

LOAD CELL ➔ *Tooling / Supervisor* level

In this menu it is possible to perform a load cell calibration. (500gr. Calibration weight required) or perform a weight check.

Loadcell Calibration:
Always perform a load cell calibration after the machine is installed, with an empty hopper, the motor and hopper lid mounted.
Make sure that the controller is ON for at least 15 minutes and the system must be stable during calibration.

- Press the Calibrate button.
- Follow the instructions on the screen.

Weight check:
The following parameters will be shown in this menu:

- Weight: Actual weight on the weighing scale.

If the Object weight is not corresponding with the real weight, perform a new load cell calibration.

LEARN MATERIAL➔ *Tooling / Supervisor level*

The OPTI-FEED can be started in mainly two ways:

1)Start the unit **without** learning of material before start.
After pressing the START button the unit starts dosing on a speed that is based on default materials which are pre-programmed in the controller.

2) Start the unit **with** learning of material before start.
After pressing the START button the unit starts dosing on a speed that is based on learned materials made by the user which are stored in the controller

A material calibration can be learned as follows:
Go to the LEARN menu by opening the menu bar and select the learn function .

- Enter Material name and your production Parameters by pressing on the corresponding fields. All fields must be filled in before learning can start.
- Start learning. A screen will appear, asking to check the motor connection and if the cylinder needs filling (prime).
- The learn function will take minimal about 3 minutes but can take more time depending on the used material and production parameters. When the setpoint is reached within the set calibration deviation (Cal dev: default = 5%) the learn procedure can be completed by pressing "Finish". The learned material will be saved automatically.
- After saving you will automatically go to the PRODUCTION screen and stored material is automatically selected.

PRODUCTION ➔ *Tooling / Supervisor level*

The production data can be entered by touching the corresponding field.

Injection Moulding:

1. **Ref.Curve/material:** Movacolor pre-programmed curve, or USER defined curve (material name) is displayed.
2. **Color amount (%)**
3. **Shot weight (gr.)**
4. **Dosing time (sec.)** ⓘDosing time only visible in Timer mode, otherwise relay time will be displayed
5. **Prime.** Filling the dosing cylinder before start. The prime menu appears by pressing .

Extrusion:

1. **Ref.Curve/material:** Movacolor pre-programmed or USER defined curve (material name) is displayed
2. **Color amount (%)**
3. **Extruder capacity (kg/h)**; In tacho mode the actual capacity is displayed. In Relay mode the extruder capacity can be entered.
4. **Tacho Voltage.** (ⓘ only visible in tacho mode)
   - **Manual:** Tacho voltage with corresponding extruder capacity can be entered manually.
   - **Synchronize:** Tacho voltage can be read from extruder and actual extruder capacity can be entered.
5. **Prime.** Filling the dosing cylinder before start. The prime menu appears by pressing .

Production (Motor On/Off)

Press to start / stop dosing. The motor on/off switch will turn from green to red when dosing is started.

The start LED blinks when the unit is waiting for an input signal. If the unit is dosing the Start LED lights continuously.
For stopping production press again. The motor on/off switch will turn to green again

ALARM HISTORY ➔ *Supervisor level*

Display of the alarm history. Scroll through the stored alarms to see the log.

When a problem occurs using the OPTI-FEED, the display will indicate an error code and description. Also the alarm LED lights up.
Together with the displayed error an output contact can be switched.
To reset an alarm / warning during production press to Stop or / and confirm .

Free programmable errors can be configured to an **Alarm or Warning.**

Warning: Warning output is ON, but the dosing unit **continues** running .

Alarm: Alarm output is ON and the dosing unit **stops** running**.**

configuration menu)
A list with the available alarms/warnings will be displayed. Pressing on the alarm/warning button behind the description will change the status Alarm ➔ Warning

Code	Warnings/alarms (programmable)	Description
1	Filling system unable to load material	Fill system is not working correct
2	Low hopper level	Material is below the hopper start filling weight
3	Empty hopper level	Material is below the hopper empty weight
4	Hi-Hi level	Hopper weight has reached the EX-HH level
5	Minimum motor speed < 0,1 RPM	Calculated motor speed is too low
6	Maximum RPM exceeded, change dosing tool for higher capacity	Calculated motor speed is too high
8	Maximum deviation exceeded	The deviation of the material output is too high
9	Master /slave connection failure	Connection failure between multi component controllers

Alarms, *Non adjustable*

100	Motor connection failure:	Motor not connected / Motor or connection damaged
102	Load cell connection failure	Load cell connection is not correct

It is possible to push the warnings away, but when the error remains, it will be back after 60 seconds.

OPTI-FEED F.A.Q and Trouble shooting

GENERAL

The following variables may influence the accuracy and repeatability of the system:

1. Material properties. Easy flowing, non-sticky and non-static material that comes in the form of small regular shaped granules or powder can be dosed very accurate and regular.
2. Periodical cleaning of the dosing cylinder and seals is necessary for proper operation.
3. Extreme vibrations and shocks can have negative influence on system performance.
4. Vacuum or overpressure in the neckpiece caused by driers or hopper loaders.

Besides the variables mentioned so far, with injection molding the shot to shot accuracy depends on the shot time in combination with granule size and weight. If relatively big and heavy granules have to be dosed in a very short time, it will influence the shot accuracy and repeatability, because if only a few granules are dosed during the shot, one granule more or less makes a big difference on the total shot weight.

System is NOT starting up when switched ON by main power switch

1. Main fuse inside the controller can be blown

Color variations

1. Unstable relay or tacho signal.
2. Bridging or rat holing of the material inside the hopper can happen if the material is not free flowing.
3. Bridging or rat holing of the material inside the hopper can happen if the material is extremely static.
4. Extremely static material can contaminate the dosing cylinder.
5. In case of water cooled neckpiece, check if there is material build up around the dosing cylinder and the water cooled pipe. Check also the water supply to the neckpiece.

Weighing is not correct

1. Check if transport protection is removed.
2. Weighing platform is touched by something that influences the weighing.
3. Hopper loader tubes are not fixed in the right way.
4. Safety bolts are not free / touching the frame.

ELECTRICAL INSTALLATION

Input signal to the OPTI-FEED can be made in the following ways, in accordance with the configuration.

Potential free contact	Potential contact [Min 18VDC to Max.30VDC]	Tacho
9 INP1	10 + 24Vdc	7 GND; 9 INP1 (-); 10 (+)	7 GND; 9; 10; 8 (+) [Min 0VDC to Max. 30VDC]

7 = Yellow
8 = Green
9 = White
10 = Brown

Hopper loader system

Valve output **(24VDC)**

29 Outp.2; 30 +24VDC

29 = White
30 = Brown

Status outputs (Warning, Alarm and Run)

Alarm/Warning Output **Potential contact(24VDC)**	Alarm Output Potential free contact	Run Output Potential free contact
27 Outp. 1; 28 +24VDC	32 33	35 36

27 = White
28 = Brown

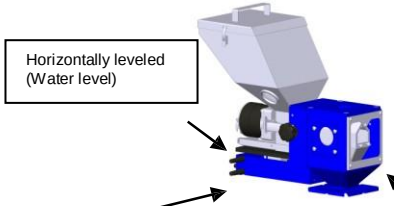
The numbers XX **can be found on the printed circuit board**

MECHANICAL INSTALLATION

All mechanical parts are pre-assembled, making installation quick and simple.
1. Remove transport protection (under side of the load frame) before installation!
2. Install the neckpiece directly on top of the entrance of the production machine.
   a. Make sure that the complete unit is mounted horizontally leveled (water level) and fixed securely.
   b. Assure proper grounding to control cabinet, neckpiece and dosing unit
3. Connect the unit to the neckpiece by turning curled knob clockwise.
4. Mount the controller vibration free and conform specified temperatures.

Mount the unit in a 90-degree angle to the machine barrel.

As shown in the picture.



Gravimetric Blending & Control

OPTIFEED
PROFIBUS/PROFINET

Manual 1.11.UK.03

Software version	:	V1.11
Manual revision	:	0.3
Date	:	November 2013

TSM Control Systems, The Demesne, Dundalk, co.Louth, Ireland.
Internet: www.tsm-controls.com • Email: info@tsm-controls.com
+ 353 42 9335560 + 353 42 9334422

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1 Introduction

Thank you for purchasing a Optifeed metering device. This manual is addressed to operators and **qualified technicians** taking care of the metering of dry additives to ensure correct use of the Optifeed dosing unit.
ⓘ IMPORTANT NOTE: THIS MANUAL MUST BE READ BEFORE INSTALLING THE DOSING UNIT. KEEP THIS MANUAL IN A PLACE ACCESSIBLE FOR ALL OPERATORS.

1.1 Symbols

ⓘ Important note

Attention; safety regulations for the operator

1.2 Terms

Operator:	A person charged to operate, adjust, maintain and clean the machine.
Qualified Technician:	A specialized, suitable trained person authorized to execute the installation, non-routine maintenance, or repairs requiring special knowledge of the machine and how it operates.
Multi component:	Two ore more dosing systems on one machine.

1.3 Transport

To protect the Optifeed unit against damage during transport, the unit is packed in a cardboard box filled with polyurethane foam. Delivery terms are Ex-Works Sneek, The Netherlands. Buyer is responsible for the transport. Optifeed cannot be held liable for any damage during transport.

1.4 Receipt

Check the unit thoroughly upon receipt. Pass any remarks to the local agent or Optifeed within 8 days upon receipt of goods.

1.5 Manual description

This manual is a supplement of the general Optifeed manual. Please check the Optifeed website for this manual, or ask your local Optifeed representative.

This manual describes Profibus and Profinet implementation. At moment of writing, the Profinet interface is preliminary. Depending on Optifeed software version, some settings can differ as described in this manual.

2 General information

2.1 Safety

The equipment is only designed and may only be used for the dosing of dry additives. Any use that is not in conformity with the instructions is considered improper and as such frees the manufacturer from any liability regarding damage to things and/or persons.

Before switching on the unit for the first time, ensure that the mains power voltage applied is between 80 and 260Vac.

Always switch off the Optifeed control cabinet and disconnect the mains power plug from electrical power before performing maintenance.

Ensure that all parts are securely fixed to the extruder or injection molding machine.

Dangerous voltages are present inside the control cabinet for up to 2 minutes after it has been switched off.

2.2 Certification

The Optifeed dosing unit is designed and produced in conformity with the following European regulations:

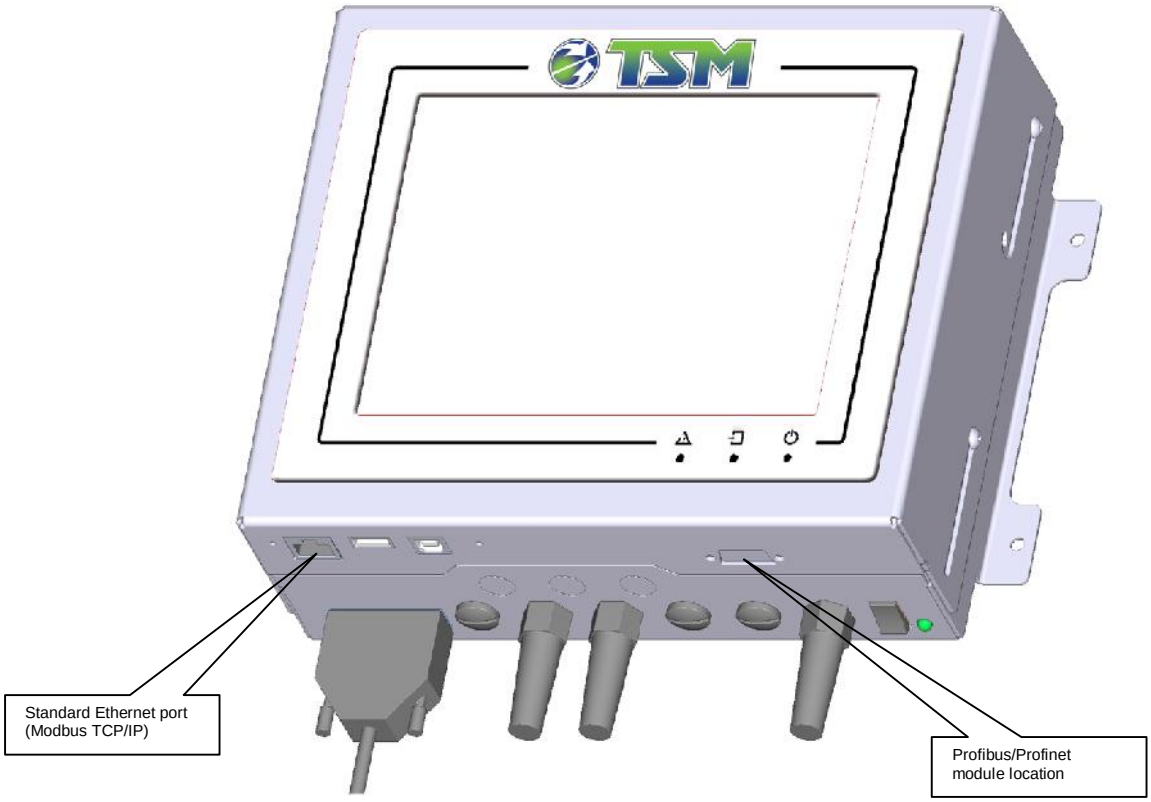
- CE standards for machinery (health, safety, environment)
- EMC (electromagnetic compatibility)
- VEM (safety electric material)
- 2006/42/EG

2.3 Operating environmental conditions

- The unit must be protected against weather conditions
- Operating temperature -20 to +70 degr. C.
- Protection class: IP-50

3 Communications Setup

3.1 Ethernet connection location



3.2 Module installation

The Profibus or Profinet communications module can be built in afterwards. Picture below explains the position of the communications card. Depending on the type of Optifeed casing you have, it can be necessary to use a special adapter plate, which is included in the package.

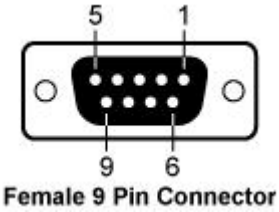
ⓘ The Profinet module requires a certain board revision and Optifeed housing. Please refer to Optifeed service department to check compatibility with your Optifeed.

3.3 Cabling

3.3.1 Profibus

Use proper Profibus certified cabling and connectors to establish the Profibus network connection.

3.3.2 Profibus electrical connection



Female 9 Pin Connector

PIN	SIGNAL	FUNCTION
1	Shield	Ground connection
2	NC	Not connected
3	**RxD/TxD-P**	**Data line plus (B-line)**
4	NC	Not connected
5	**DGND**	**Data ground**
6	**VP**	**+5V supply for terminating resistors**
7	NC	Not connected
8	**RxD/TxD-N**	**Data line minus (A-line)**
9	NC	Not connected
Case	Shield	Ground connection

See for more information: http://www.profibus.com

3.3.3 Profinet

Use proper Ethernet cabling type CAT5e to establish a network connection to your plant, machine or corporate network.
The Optifeed Profinet module is equipped with 2 standard RJ45 type connector.

3.4 Profibus/Profinet setting

The profibus and profinet module needs to be enabled. This can be done in the System Configuration menu:

I/O module : NONE – ANALOG – PRO.BUS – PRO.NET

ⓘ Highlighted is default setting.

3.4.1 Profibus address

The Profibus protocol requires a device address. The address of the Optifeed Profibus interface can be set with the System Configuration setting:

Device ID : 1-231

ⓘ Highlighted is default setting.
ⓘ This setting is shared with MODbus TCP/IP.

4 Optifeed Profibus/Profinet

4.1 General information

- In Profibus modus the START/STOP button is disabled on the touch screen.
- The input start (dosing) signal is given via Profibus/Profinet or Input wire on TC controller (mainboard connection 9,10).
- The OPTIFEED will behave as a Profibus/Profinet slave

4.2 Touchscreen functions

The following functions must be operated on the touchscreen and cannot be altered/activated using Profibus/Profinet:

- Configuration
- Loadcell calibration
- Learn material
- Material selection
- Recipe management
- Recipe selection

4.3 Touchscreen configuration

The communications module must be enabled in the configuration, see chapter 3.4

ⓘ When Profibus or Profinet is enabled, all settings, listed in the register overview are not accessible at the touchscreen itself. These settings are overwritten by the Profibus/Profinet protocol.

4.4 Available parameters

You will be able to read/write the following parameters:

Production status	Off, Standby, Dosing, Filling, …..
Current machine status	System on, Start input, Sensor input, Alarm active
Read unit type	Opti Balance, Opti Weight, Opti High Output, ….
Active alarm numbers	Read active alarms, reset alarm condition
Setpoints	Read actual setpoints, set dosing setpoints
Consumption	Read total consumption, read batch consumption, reset counters
Hopper weight	Read current hopper weight
Motor speed	Read / write the motor speed of the dosing unit
Dosing time	Read / write the dosing time for injection moulding
Tacho voltage	Read actual tacho voltage, set tacho voltage ratio
Extruder throughput	Read actual extruder capacity, write extruder capacity setpoint
Regrind setpoints	Read actual regrind setpoints
Production commands	Write production commands, start/stop, reset alarm, fill, ……
Prime	Start stop prime at set motor speed

4.5 Optifeed OPTIFEED Profibus/Profinet protocol

It is possible to operatate op to 5 different components/color additives with one Touchscreen controller. The Optifeed has only one Profibus/Profinet slave address, which represents all (upto 5) configured components. Each component can be selected by the appropriate number in the first byte of the 96 bytes data packet. The complete packet is written to the selected device on the Optifed. The Optifeed will respond with the same 96 bytes packet containing the actual settings and process values.
When an invalid / unconfigured device is selected, the Optifeed will respond with the value 255 in the first byte of the 96 bytes data packet, indicating an invalid/unconfigured device is requested.

Example:
OPTIFEED is configured with 3 components, the first component is a Opti Weight, the second and third components are Opti Balances.

- The Profibus/Profinet master issues a packet with the first byte set to value 1. The Optifed will respond with a 96 bytes data packet, byte one set to the value 1, indicating device 1 is selected, and byte 36 set to 1, indicating device 1 is representing a Opti-Weight.
- The Profibus/Profinet master issues a packet with the first byte set to value 2, float starting at offset 64 set to 5,6%. The Optifeed will respond with a 96 byte data package, byte 1 set to value 2, indicating device 2 is selected, byte 36 set to 2 value 2, indicating device 2 is representing a Opti-Balance, float starting at offset 60 corresponding the calculated dosing setpoint in gram per second.
- The Profibus/Profinet master issues a packet with the first byte set to value 4. The Optifeed will respond with a 96 byte data packet, with the first byte set to value 255, indicating an invalid device is selected.

ⓘ When the Optifed can is equipped with a Profibus/Profinet card, it is not recommended to use Modbus TCP/IP in conjunction with one of these optional interface cards.

4.6 Data types

The Optifeed uses different data types

Data type	**Length**		**Number of Modbus registers**
Bit	1 bit	0..1	Packed in a Byte
Byte	8 bits	0..255	1
Word	16 bits	0..65535	1
Float	32 bits		2

4.7 Global / Unit

The scope of each parameter/register can be Global or Unit. Global means that it is a parameter for the whole system. Example: Shot weight, this is a setting which is global for the whole system since the system is installed on a single injection molding machine. In most cases the global parameters can be read/written at each unit (Device register).

4.8 Register Overview

Master -> OPTIFEED (request)				
Offset	**Data type**	**Description**	**Units**	**Remarks**
0	Byte	Device		1 through 5
1	Byte	Future use		
2	Byte	Valid		
3	Byte	System commands		See note 1
4..11	Byte	Future use		
12	Float	Shot weight set	Gram	Injection
16	Float	Dosing time set	Seconds	Injection
20	Float	Extruder capactity set	Kg/h	Extrusion
24	Float	Tacho set	V	Extrusion
28..51	Byte	Future use		
52	Byte	Device commands		See note 2
53..63	Byte	Future use		
64	Float	Color percentage setpoint	%	
68	Float	Prime speed setpoint	RPM	
72	Float	Motor speed setpoint	RPM	Used in RPM mode only
76..95	Byte	Spare		

Notes:

1) System command bits
   - Bit 0: Start
   - Bit 1: Stop
   - Bit 2: Remote start input
   - Bit 3: Reset active alarm
   - Bit 4..7: Future use

2) **Device command bits**
   - Bit 0: Prime start
   - Bit 1: Prime stop
   - Bit 2: Manual filling (opens fill valve)
   - Bit 3: Reset batch consumption
   - Bit 4: Reset total consumption
   - Bit 5..7: Future use

OPTIFEED -> Master (response)				
Offset	**Data type**	**Description**	**Units**	**Remarks**
0	Byte	Device		1 through 5
1	Byte	Future use		
2	Byte	Data valid		Valid data, can be used by PLC
3	Byte	CPU running indicator		0..255 counter
4	Byte	System status bits		See note 3
5..7	Byte	Future use		
8	Float	Main mat. ext. capacity	Kg/h	Opti Weight
12	Float	Total ext. capacity	Kg/h	Opti Weight
16	Float	Total color percentage	%	Opti Weight
20..35	Byte	Future use		
36	Byte	Unit type		See note 4
37	Byte	Alarm code		See manual
38	Byte	Production status		See note 5
39	Byte	Device status bits		See note 6
40	Float	Dosing time	Seconds	
44	Float	Actual extruder capacity	Kg/h	
48	Float	Actual tacho voltage	V	
52	Float	Actual hopper weight	Gram	
56	Float	Actual motor speed	RPM	
60	Float	Color capacity setpoint	g/s	
64	Float	Color capacity actual	g/s	
68	Float	Batch consumption	Kg	
72	Float	Total consumption	Kg	
76	Float	Actual regrind percentage	%	Regrind
80	Float	Actual filling level	Gram	Regrind
84..95	Byte	Future use		

Notes:

3) **System status bits**

Bit 0:	System started
Bit 1:	System alarm active
Bit 2:	System start error
Bit 3:	System start input
Bit 4..7:	Future use

4) **Unit type**

1:	Opti Weight Opti
2:	Balance Opti
3:	High Output
4:	Opti Balance Regrind
5:	Opti High Output
6:	Regrind Future use

5) **Production status**

0:	Invalid
1:	Off
2:	Standby
3:	Dosing
4:	Filling
5:	Filling (not used)
6:	Unloading (Opti Weight)

6) **Device status bits**

Bit 0:	On
Bit 1:	Alarm
Bit 2:	Prime busy
Bit 3:	Fill valve
Bit 4:	Learn / OK
Bit 5:	Status start input
Bit 6:	Status sensor input (INP-1)

4.9 Register description

4.9.1 Master -> Optifeed

0: Device Scope: Unit Writable at each configured unit
Device selection, selects one of the configured components. Data will be send to the component selected with this byte.

1: Future use Scope: Global Writable at each configured unit
Reserved for future.

2: Valid Scope: Unit Writable at each configured unit
To be defined.

3: System commands Scope: Global Writable at each configured unit
Device selection, selects one of the configured components

Bit	Description	Function	Type	Scope
0	Start	System is started (start button)	SW bit	Global
1	Stop	System is stopped (stop button)	SW bit	Global
2	Remote start input	Start dosing	HW bit	Global
3	Reset active alarm	Active alarm notification	SW bit	Global

4..11 Future use

12: Shot weight set Scope: Unit Writable at each configured unit
Injection molding only, the weight of the total material fed into the mould during one shot. In grams

16: Dosing time set Scope: Global Writable at each configured unit
Injection molding, timer mode only. Duration of one shot (time the barrel injects material in the mould, not the total cycle time). In seconds.

20: Extruder capacity set Scope: Global Writable at each configured unit
Extrusion, relay mode: Extruder total throughput setpoint in kg/h.
Extrusion, tacho mode: Extruder capacity <–> Tacho voltage ratio kg/h setpoint (see Tacho set)

24: Tacho set Scope: Global Writable at each configured unit
Extrusion, tacho mode: Extruder capacity <–> Tacho voltage ratio Voltage setpoint (see Ext. cap)

28..51 Future use

52: Device Commands Scope: Unit Writable at each configured unit
Control bits to control the selected unit. By setting/clearing bits in this register several actions can be made.

Bit	Description	Function	Scope
0	Prime start	Activate dosing tool prime function	Per unit
1	Prime stop	Cancel/stop the current prime action	Per unit
2	Manual filling	Opens the fill valve/activates loader	Per unit
3	Reset cons. batch	Reset batch consumption counter	Per unit
4	Reset cons. total	Reset total consumption counter	Per unit

Prime start: Setting this bit will start the prime function. With the prime function the dosing tool will be filled with material. Motor starts running at prime speed setpoint (register 68). Can only be started when system status is off.
Prime s**top**: Setting this bit will stop the prime function.
Manual fill: In some cases it is required to fill the hopper before starting the process. This can be done by setting the manual fill bit.
CAUTION, using this bit can cause overfilling of the hopper.
Reset cons. Batch: Reset the batch consumption counter (selected component only).
Reset cons. Total: Reset the total consumption counter (selected component only).

53..63 Future use

64: Color % setpoint Scope: Unit Writable at each configured unit
Additive dosing amount setpoint. Percentage of the total material flow/shot weight added by the selected component. Injection molding example: shot weight 25 gram, 10% additive will give a additive shot weight of 2,5 gram. Extrusion example: total extruder material flow of 100kg/h, 15% additive setpoint will give an additive dosing of 15kg/h (virgin 85kg/h, additive 15kg/h).
Note: when set at 0%, the unit will be switched off.

68: Prime speed setpoint Scope: Unit Writable at each configured unit
Motor speed setpoint used during prime function (see register 52, bit 0). Speed in revolutions per minute.

72: Motor speed set Scope: Unit Writable at each configured unit
Volumetric (RPM) mode only. Motor speed setpoint in revolutions per minute.

76..95 Future use

4.9.2 Optifeed -> Master

0: Device Scope: Unit Readable at each configured unit
Device selection, in request selected unit. Data in this package belongs to the selected unit. If 255 is returned, an invalid unit is selected in request.

1: Future use

2: Valid Scope: Unit Readable at each configured unit
To be defined.

3: CPU running indicator Scope: Global Readable at each configured unit
Running counter, continuously increasing. Can be used to monitor the Profibus/Profinet connection.

4: System status bits Scope: Global Readable at each configured unit

Status bits indicating status of the whole system

Bit	Description	Function	Scope
0	System started	System is started, components dosing or standby	Global
1	System alarm active	One or more components generate alarm	Global
2	System start error	Fault occurred, caused by wrong parameters	Global
3	System start input	Start input activated	Global

5..7 Future use

8: Main mat. Ext. capacity Scope: Unit Readable at each configured unit

Value representing the main material flow measured by the Opti Weight in kg/h. Opti Weight and extrusion mode only.

12: Total ext. capacity Scope: Unit Readable at each configured unit

Gives the total material flow through the extruder. Main material + all dosed components (Opti Weight + Opti Bal…..) in kg/h. Opti Weight and extrusion mode only.

16: Total color % Scope: Unit Readable at each configured unit

Gives the total added color percentage of the main material through the extruder in %. Opti Weight only. Total color % = 100% - sum of dosing % (equals part of flow through the Opti Weight)

20..35 Future use

36: Unit type Scope: Unit Readable at each configured unit

Indicates which kind of Optifeed device is configured at selected position.

1: Opti Weight
2: Opti Balance
3: Opti High Output
4: Opti Balance Regrind
5: Opti High Output Regrind

37: Alarm code Scope: Unit Readable at each configured unit

In case of alarm, the active alarm number is displayed in this register. For a description of the alarm see Optifeed manual.

38: Production status Scope: Unit Readable at each configured unit

Indicates the current production status of the selected dosing unit, a number represents a status

1:	Off	System off, no action
2:	Standby	System on, waiting for start signal
3:	Dosing	Motor is running and dosing material into the neckpiece
4:	Filling	Filling is detected, hopper is being filled
5:	Filling	Not used
6:	Unloading	MCWeight only, system is unloading material and measuring throughput

39: Device status bits Scope: Unit Readable at each configured unit

Indicates the current device status of the selected unit, each bit represents a function

Bit	Description	Function
0	On	The unit is on (standby or dosing)
1	Alarm	Unit has active alarm
2	Prime busy	Priming activated
3	Fill valve	Filling system activated
4	Learn / OK	0 = learn, 1 = OK
5	Status start input	Status of HW input of selected unit
6	Status sensor input (INP-1)	Status of sensor input of selected unit

40: Actual dosing time Scope: Global Readable at each configured unit
Shows the elapsed dosing time in seconds. Injection molding only, in Extrusion configuration this value shows 0.

44: Actual Extr Capacity Scope: Global Readable at each configured unit
Shows the actual extruder capacity (material flow through the whole system) in kg/h. Used in extrusion mode only.

48: Actual tacho voltage Scope: Global Readable at each configured unit
Actual voltage supplied to the tacho input of the selected component. Used in extrusion mode only. Units Volts.

52: Actual hopper weight Scope: Unit Readable at each configured unit
Gives the actual hopper weight in grams. An empty hopper should equal 0 gram.

56: Actual motor speed Scope: Unit Readable at each configured unit
Gives the actual motor speed in RPM. For MCWeight this value reads 0.

60: Color capacity setpoint Scope: Unit Readable at each configured unit
Gives the calculated dosing rate setpoint of the unit in gram per second.

64: Color capacity actual Scope: Unit Readable at each configured unit
Gives the actual dosing rate of the unit in gram per second.

68: Batch consumption Scope: Unit Readable at each configured unit
Shows the total material consumption for the current batch in kg. This value is an approximation and can have a small deviation caused by theoretical calculated value during filling of the hopper. The shown value is for the selected component only. The batch counter can be reset by setting bit 3 of the Device command register

72: Total consumption Scope: Unit Readable at each configured unit
Shows the total material consumption for the selected component in kg. This value is an approximation and can have a small deviation caused by theoretical calculated value during filling of the hopper. The shown value is for the selected component only (in multicomponent setup). The batch counter can be reset by setting bit4 of the Device command register.

76: Actual regrind % Scope: Unit Readable at each configured unit
Shows the actual regrind dosing setpoint in %. Used in Twin (closed loop regrind) configuration. This percentage can differ from the regrind setpoint %, and depends on available regrind.

80: Actual regrind filling level Scope: Unit Readable at each configured unit
Future use

84..95 Future use

5 GSD

5.1 Profibus GSD file

The Profibus GSD file can be obtained by contacting TSM Engineering personnel at +353 42 9335560 or alternatively service@tsm-controls.com.

```
;============================================
; Profibus Device Database
;============================================
; Type            : Optifeed DP slave
; Model           : MCTC      Revision 1.7
; Description     : Dosing controller
; File Create Date : 25-oct-2012
; Author          : Hans Helmhout
;============================================

#Profibus_DP
Station_Type = 0
Protocol_Ident = 0
Vendor_Name = "Optifeed"
Model_Name = "MCTC"
Revision = "0.1"
Ident_Number = 0x1122
Hardware_Release = "A01"
Software_Release = "Z01"
9.6_supp = 1
19.2_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1
MaxTsdr_9.6 = 60
MaxTsdr_19.2 = 60
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150
MaxTsdr_3M = 250
MaxTsdr_6M = 450
MaxTsdr_12M = 800
Repeater_Ctrl_Sig = 2


;*****************************************************************************
;**              Slave  Data                                    **
;*****************************************************************************
Freeze_Mode_supp = 0
Sync_Mode_supp = 0
Auto_Baud_supp = 1
Set_Slave_Add_supp = 0
Min_Slave_Intervall = 5

; Maximum length of user parameter
User_Prm_Data_Len = 1

; Watchdog timebase 10mS
User_Prm_Data = 0x00

Modular_Station = 1
Max_Module = 2
Max_Input_Len = 96
Max_Output_Len = 96
Max_Data_Len = 488

; Status              Tx 96bytes Rx 96 bytes
Module = "MCTC_PB1"  0xC0, 0x3F,0x3F
EndModule

Module = "MCTC_PB2"  0xC0, 0x1F,0x1F
EndModule
```

5.2 Profinet GSDML file

The Profinet GSDML file can be obtained by contacting TSM Engineering personnel at +353 42 9335560 or alternatively service@tsm-controls.com.

6 Document revision history

Revision	Notes	Date
01	Initial release	October 23 2012
02	- Changed to Optifeed software version v1.10 - Added protocol example - Added register description - Added connector pinout - Added GSD file description	March 25 2013
03	- Added Profinet - Changed to Optifeed software version v1.11 - Changed document layout - Added detailed register description	November 21 2013

Optifeed Modbus TCP/IP register description
Software revision: 1.09_0005r
Last document update: 25-02-2013
Status: preliminary

Register	Offset	Type	Words	Description	Unit	Note		Access
1	0	Byte	1	CPU running indicator	0..255			RO*
2	1	Byte	1	Unit type	See note	1		RO*
3	2	Byte	1	Production status	See note	2		RO*
4	3	Byte	1	Status bits	See note	3		RO*
5	4	Byte	1	Alarm number	See note	4		RO
6	5	Byte	1	Spare				RO
7	6	Float	2	Capacity setpoint	g/s			RO*
9	8	Float	2	Capacity actual	g/s			RO*
11	10	Float	2	Consumption batch	kg			RO*
13	12	Float	2	Consumption total	kg			RO*
15	14	Float	2	Hopper weight	g			RO*
17	16	Float	2	Motor speed	RPM			RO*
19	18	Float	2	Actual dosing time	s		Injection	RO*
21	20	Float	2	Actual tacho voltage	V		Extrusion	RO*
23	22	Float	2	Extr Capacity	kg/h		Extrusion	RO*
25	24	Float	2	To go	min			RO*
27	26	Float	2	Actual regrind %	%		Twin	RO+
29	28	Float	2	Actual regrind filling level	g		Twin	RO+
31	30	Float	2	Extr capacity main	kg/h		Weight	RO*
33	32	Float	2	Total capacity	kg/h		Weight	RO*
35	34	Float	2	Total balance %	%		Weight	RO*

Notes:

1) **Unit type**
   1: Opti Weight*
   2: Opti Balance*
   3: Opti Balance HO*
   4: Opti Balance Regrind*
   5: Opti Balance HO Regrind*

2) **Production status**
   0: Invalid
   1: Off*
   2: Standby *
   3: Dosing *
   4: Filling *
   5: Filling
   6: Unloading (Opti Weight)*

3) **Status bits**
   Bit 0: System on *
   Bit 1: Start input *
   Bit 2: Sensor (INP-1) *
   Bit 3: Alarm *
   Bit 4: Valve *
   Bit 5: Learn / OK *

4) **Alarm number**
   See manual

5) **Command bits**
   Bit 0: Start (Master)*
   Bit 1: Stop (Master)*
   Bit 2: Reset alarm *
   Bit 3 Remote start input*
   Bit 4: Reset cons. Batch*
   Bit 5: Reset cons. Total*
   Bit 6: Manual fill (production off)*

PRELIMINARY

Register	Offset	Type	Words	Description	Unit	Note		Access
1001	1000	Word	1	Command bits	See note	5		RW*
1002	1001	Word	1	Spare				RW
1003	1002	Float	2	Color %	%			RW*
1005	1004	Float	2	Shot weight	g		Injection	RW*
1007	1006	Float	2	Dosing time set	s		Injection	RW*
1009	1008	Float	2	Ext cap	kg/h		Extrusion	RW*
1011	1010	Float	2	Tacho set	V		Extrusion	RW
0013	1012	Float	2	Motor speed set	RPM		Volumetric	RW

IP address: Optifeed Menu setting
Multi component; Device address: 1..5
Modbus function codes: 04, 06

* Tested and functional
+ Tested, not functional

PRELIMINARY

Gravimetric Blending & Control

Support frame

User Manual EX.ENG.01

Manual revision	:	01
Date	:	16-04-2009

SFG/6 SFG/12

Installation - Operation – Maintenance - Trouble shooting

TSM Control Systems, The Demesne, Dundalk, Co.Louth, Ireland.
Internet: www.tsm-conrols.com • Email: info@tsm-controls.com
+ 353 42 9335560 + 353 42 9334422

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1. Introduction

Thank you for purchasing a TSM product. This manual is addressed to operators and **qualified technicians** taking care of the metering of dry additives to ensure correct use of the TSM dosing unit.
ⓘ IMPORTANT NOTE: THIS MANUAL MUST BE READ BEFORE INSTALLING THE UNIT. KEEP THIS MANUAL IN A PLACE ACCESSIBLE FOR ALL OPERATORS.

1.1 Symbols

ⓘ Important note

⚠ Attention; safety regulations for the operator

1.2 Terms

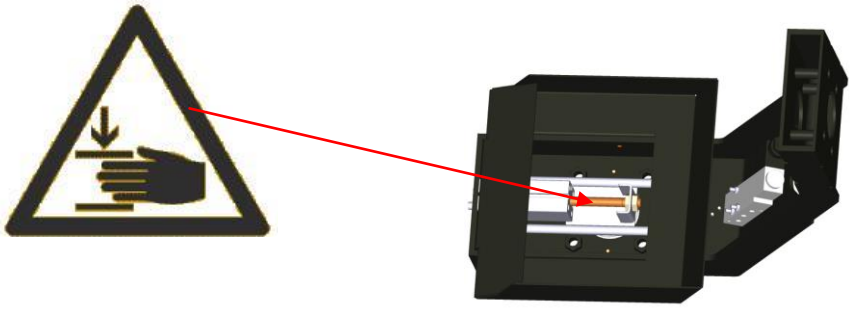
Operator: A person in charge of operating, adjusting, maintaining and cleaning the machine.

Qualified Technician: A specialized, suitable trained person authorized to execute the installation, non-routine maintenance, or repairs requiring special knowledge of the machine and how it operates

1.3 Safety

Slide gate:

⚠ Do not take the dosing unit away before the compressed air of the valve is disconnected and press STOP ⏚ on the controller to disable the valve because the knife gate valve can move!



2. Description

2.1 What is the Support Frame ?

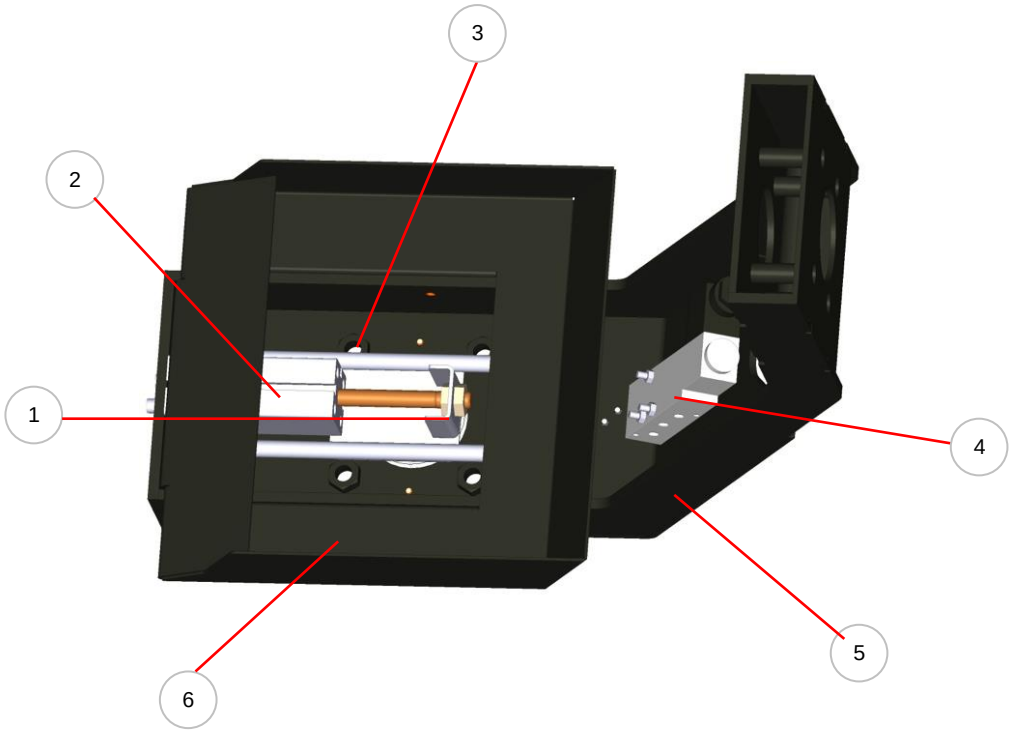
How the Support frame (EX) for External hopper (loader) works
The function of the support frame is to use an foreign hopper loader or hopper in combination with the Optifeed. The support frame is equipped with a knife gate valve for filling the hopper.
The valve is normally closed. If the filling start level is reached (default 800gr.) the valve opens and the hopper is filled until the EX-H level (default 2500gr.) is reached. Then the valve will close automatically, so the support frame works independently from the hopper loader. If for some reason the weight reaches the EX-HH level (default 3500 gr.) a warning will be given. This can happen if for example the valve doesn't close or the EX-H level is set too close to the EX-HH level. The "hopper empty weight" (default 700 gr.) generates a low-level warning if the hopper is empty. This can happen if the external hopper (loader) is empty or the valve doesn't open.

ⓘ It could be necessary to use a customer specific intermediate plate between the hopper loader and the support frame to make a good fit.

Support frame 6lltr (SFG/6)
Mounted on the Optifeed

3. Overview of parts

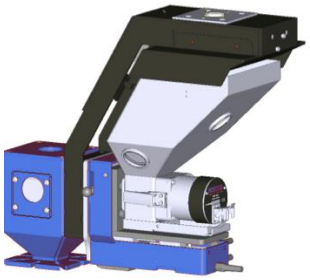
3.1 Basic parts Support frame



1	Knife gate valve
2	Cylinder for open/close the valve
3	Connection Nuts (M10) for hopper loader mounting
4	Solenoid valve
5	Support frame, base frame
6	Support frame, hopper lid

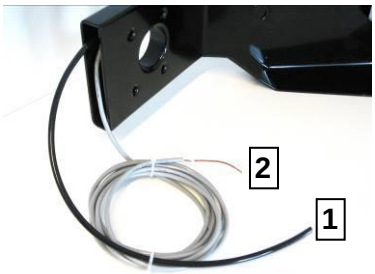
4. Installation

4.1 Mechanical installation



1. Install the Support frame assembly between the Optifeed and the neckpiece with the 4 supplied bolts.

2. Connect a ø6x4mm compressed air hose for the air supply from a compressed air source to the hose what is coming out of the frame **(1)**



4.2 Electrical installation

Solenoid valve
The in build solenoid valve cable **(2)** needs to be connected to the controller of the dosing unit Clamp 24 (White wire) & 25 (Brown wire).
The wiring diagram for this connection can be found in the user manual of the dosing unit.

4.3 Compressed Air requirements

The compressed air source must deliver a maximum of 4-6 bar of clean, dry (non-lubricated), air pressure.

ⓘ Make sure everything is connected firmly.

⚠ **CAUTION:**
Be sure to provide hazard-free routing of the tubing, keep it away from hot or moving surfaces and out of the way of personnel.

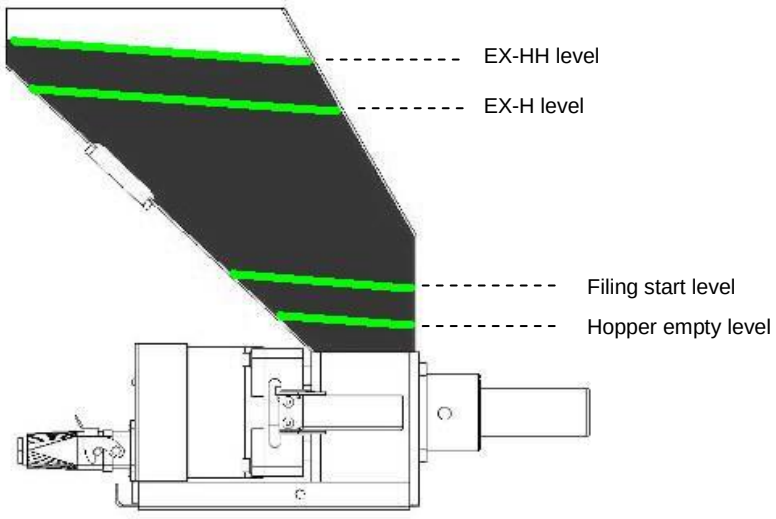
5 Operation

5.1 Starting up the EX support frame after installation

ⓘ For safety reason the hopper loader is only activated when the dosing unit is in the START mode. To deactivate the hopper loader in case of emergency, press the STOP button on the controller. Be aware that also the dosing unit will stop also.

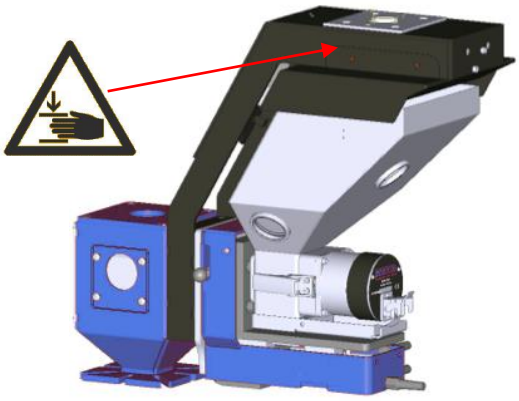
CONTROLLER SETTINGS

1. Go to the CONFIGURATION menu
2. Select **EX** as Fill System
3. Set the right levels as follows:
   - ***Hopper empty weight*** is the lowest level. If this level is reached a warning appears.
   - ***Filling start weight*** is the start filling level. If this level is reached the knife gate valve opens. The ***filling start weight*** should be set higher than the ***hopper empty weight***.
   - ***EX-H level*** is the level where the knife gate valve will be closed again.
     To set the ***EX-H level*** (stop filling). It is recommended to take a safety margin to prevent the hopper from overfilling. If the volume of the hopper is 6 liter.
     For example: EX-H level (gr.) = 5 (liter) x bulk density (gr./liter)
     If the bulk density = 700 gr./liter, the EX-H level should be set to 700 x 5 = 3500 gr.
   - The ***EX-HH level*** is the Highest level. If this level is reached a **"High High level"** warning appears. The ***EX-HH level*** should be set higher then the **EX-H level**.
     For example(6ltr hopper): 700 x 6 = 4200 gr.
   - Overfilling of the hopper should be avoided because it influences the measurement.
     So it is very important that the levels are set correctly.



Do not take the dosing unit away before the compressed air of the valve is disconnected and press **STOP** on the controller to disable the valve because the knife gate valve can move!

ⓘ If started with a empty hopper the hopper can be filled by opening the knife gate valve manually by selecting *Manual fill*: **YES** in the HOPPER LOADER menu.
Manual fill is only visible with the controller in STOP mode.



ALARMS

- *Hopper empty* warning: This message appears if the material weight in the hopper is below the set hopper empty weight. The dosing will go on because it is a warning. It is also possible to stop the dosing during this alarm by setting this message from warning to alarm in the ALARM menu of the controller (see for specific description the controllers manual)
- *High High level* warning: This message appears when the HH-Level is reached.
- *Unable to load material* warning: This message appears if during the filling no material is added into the hopper within the set EX-alarm time.

ⓘ If the EX-alarm mode is set to **OFF** the knife gate valve will close during this alarm.
If the EX-alarm mode is set to **ON** the knife gate valve stays open during this alarm.

These settings can be done in the HOPPER LOADER menu.

6. Cleaning

The Support frame assembly can easily be cleaned.

1. Disconnect power and air sources. The knife gate valve will close automatically.
2. Take out the dosing unit.
3. Blow out the support frame assembly with clean shop air.

7. Troubleshooting

WARNING:
Disconnect power and air sources.
Always disconnect the controller from its main power source and disconnect the compressed air course before servicing. This prevents the loader from starting during servicing, which could cause personal injury.

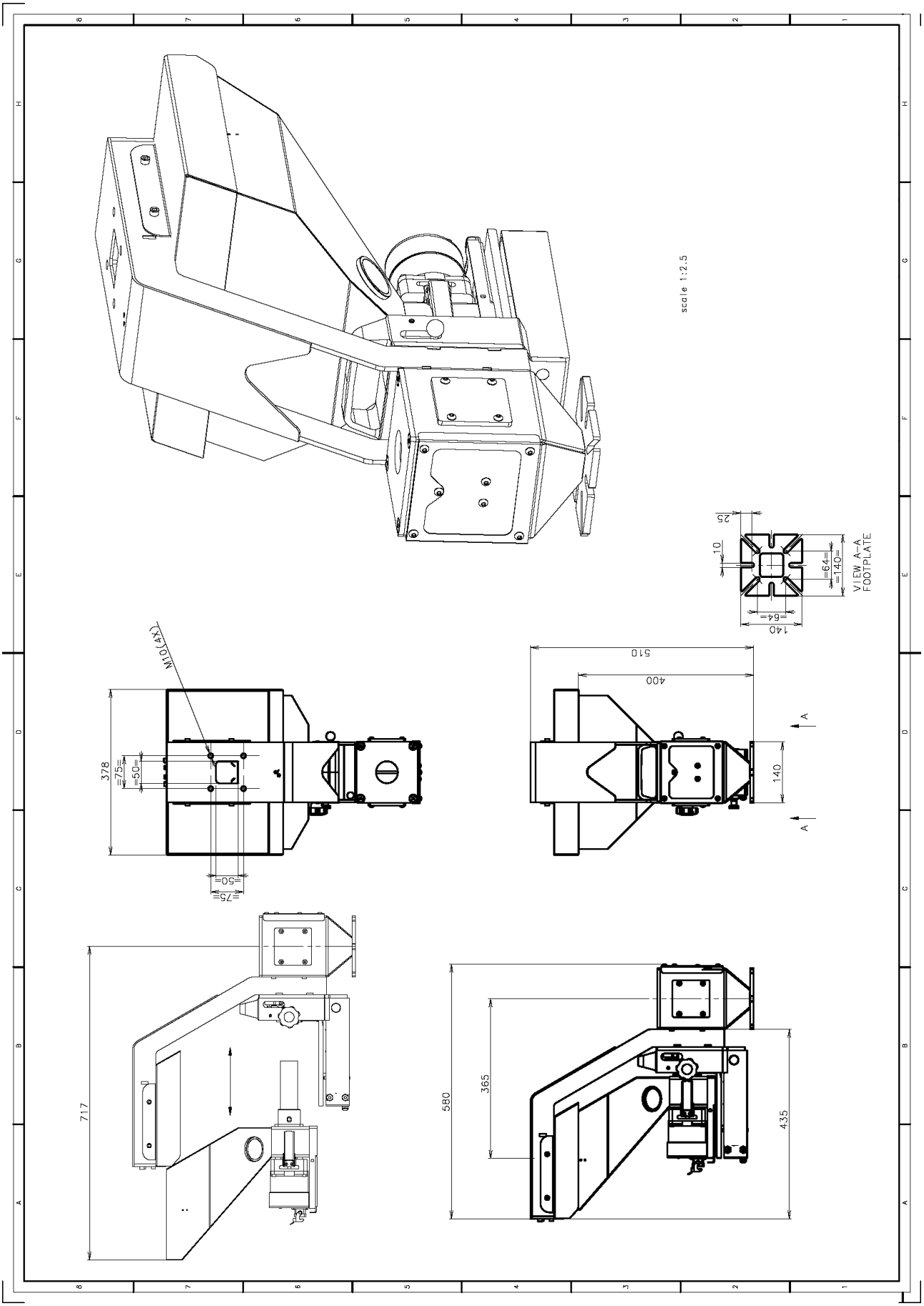
Problem	Possible cause	Solution
Hopper is not filled and the external (hopper) loader is full with material	Knife gate valve doesn't open	Check if there is enough compressed air pressure Check if there is material what blocks the knife gate valve
High High level Warning appears **Max. deviation message appears** **Max. Rpm message appears**	The Hopper is possible overfilled	Check the level settings in the CONFIGURATIONS menu. Decrease the EX-H level weight Check if there is enough compressed air pressure Check if there is material what blocks the knife gate valve

8. Technical specifications

General specifications:	SFG/12	SFG/6
Suitable for	12 liter hopper	6 liter hopper
Total maximum load	50 kg.	50 kg.
Max. throughput in combination with Optifeed*	120 kg/h	75 kg/h
Compressed air tubing:	Ø6x4mm.	Ø6x4mm.
Compressed air requirements	4 to 6 bar, clean, dry (non-lubricated),air pressure.	4 to 6 bar, clean, dry (non-lubricated),air pressure.

* The capacities are measured with normal granules with a bulk density of ~0,8 kg/dm3. Granule size 3-4 mm.
De mentioned capacities are orientation values because capacity depends on material properties.

9. General dimensions Support frame, SFG/12



10. General dimensions Support frame, SFG/6